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NEW YORK WATER SUPPLY.

We present herewith a bird's eye view, showing the routes of the old and new aqueducts supplying New York with water, and giving the principal landmarks from the Croton watershed to the city. The picture clearly presents the course of the Croton River, the location of Muscoot, Croton, and the proposed Quaker Bridge dams, and in the dotted line shows the line of the old aqueduct and in the full black line shows the course of the new aqueduct. The old aqueduct, it will be observed, follows down the southern bank of Croton River to the Hudson, and then down the bank of that stream to High Bridge, where it enters the city. This course was adopted to avoid the high ground a more direct and shorter line would have encountered, and enabled the engineers to build almost the entire distance at the level of the ground, thereby saving the great expense of tunnel and deep cut work.

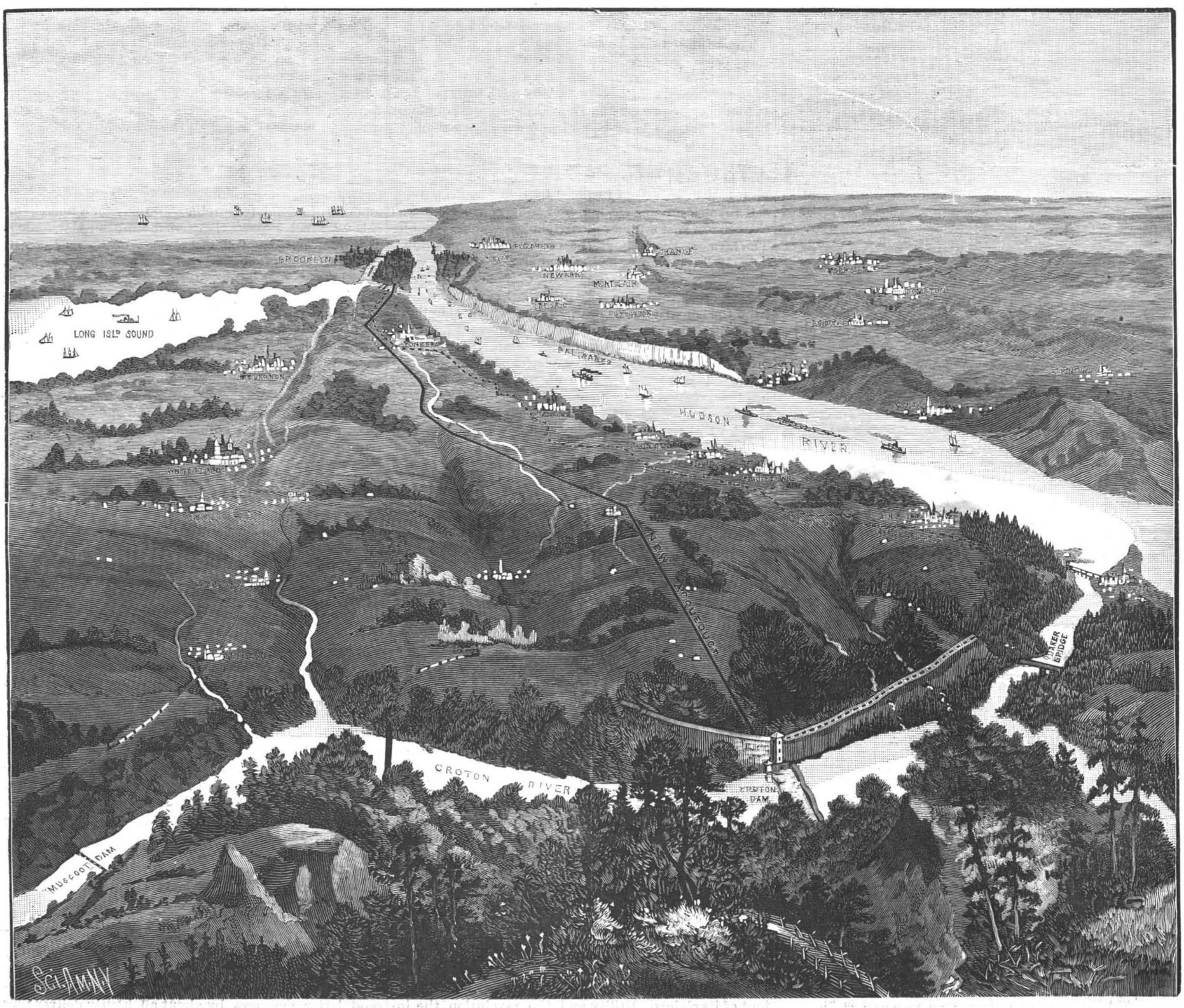
The new aqueduct passes in an almost straight line from Croton dam, where the main gate house for admitting water from either of the reservoirs at either of several depths will be located, to the Harlem, under the bed of which it will pass. Of the total length of thirty and three-quarter miles, twenty-five is through gneiss rock of different degrees of hardness, marble being found at the Harlem and at shaft 13. Between Croton Lake and the river are some twenty-nine shafts, the deepest of which is three hundred and fifty feet, which are, as far as possible, located in the valleys, the tunnel in many instances passing under hills much exceeding in height the depth of the adjoining shafts. From the bottom of each shaft the two headings are extended. This method permits of rapid work, as it multiplies the points of attack. Almost the entire aqueduct is thus tunneled through solid rock, and it is safe to assume that it will prove as durable as the hills through which it passes.

Quaker Bridge dam, located at the right in the picture, will be the most massive structure of its kind in the world. It will be situated between the hills through which the Croton flows. The great dam will be 1,500 feet long at the top and 22½ feet wide; will be 216 feet thick at the base, and from its top to the bottom of the V-shaped valley it will measure 277 feet.

It is not the intention to permit the water to flow over the dam, the contour of the country being such as to form, between the hills at one end of the dam, a natural by-pass, through which, when the reservoir is full, all the surplus water finds its way. There will thus be three dams across the Croton River. Muscoot, the upper one, now forms a pond of 2,500,000,000 gallons capacity, to which Crotom dam, the top of which is about on a level with the bottom of the other, will add 2,000,000,000 gallons. The great Quaker Bridge dam will constitute a reservoir, the water in which will be level with that inclosed by the Muscoot, and will, consequently, submerge Croton dam. This will add 20,760,000,000 gallons to the supply, at a level higher than that of the Croton dam reservoir. The aggregate capacity of the three reservoirs will be a little over 30,000,000,000 gallons, sufficient to insure an ample supply during the dry season for many years to come.

The gate house, through which the water will pass to the aqueduct, will be located in a niche cut out of the solid rock of the hill at the southern end of Croton dam. This gate house will be connected with the reservoirs at several levels, so that water can be drawn from either at the desired level, according to the condition of the water in each. There will be an independent communication between the Muscoot and Quaker dam reservoirs, so that, should it become necessary, the water can be drawn off from the middle reservoir and the latter cleaned. Provision is also made for emptying the lower reservoir, if that should ever be required. It will be observed that the ponds are practically independent of each other, although they have a common outlet.

(*Continued on page* 358.)



BIRD'S EYE VIEW OF THE ROUTES OF THE NEW YORK CITY AQUEDUCT.

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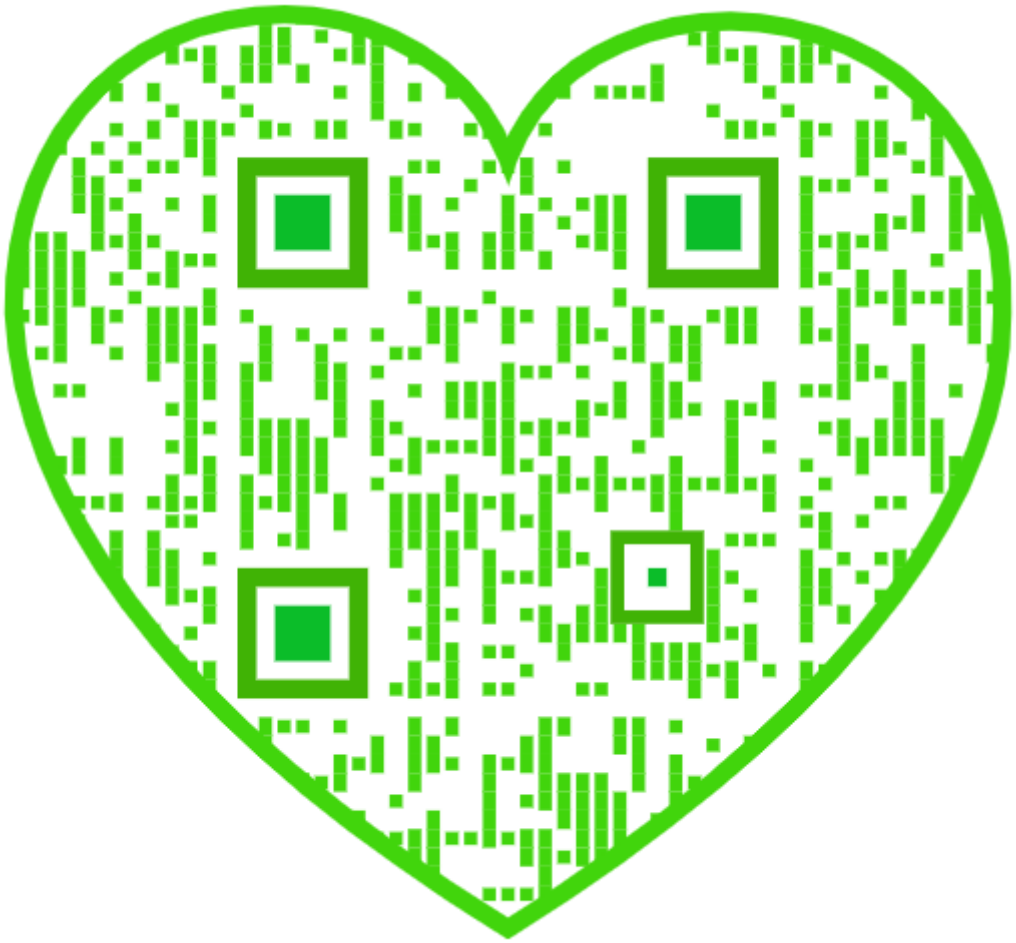

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NEW YORK, SATURDAY, JUNE 4, 1887.

Contents.

(Illustrated articles are marked with an asterisk.)

Alkaline varnish for gelatine negatives 353
Alphabet case, Safford's*..... 354
Anæsthetic, Chinese..... 361
Boat, fastest, in the world..... 361
Books and publications..... 362
Bread making..... 360
Business and personal..... 362
Cancer, calcined oyster shells as a remedy for..... 359
Car coupling, Newton's*..... 355
Caskets, device for lowering*.... 354
Cholera, spread of..... 357
Collision between the Celtic and Britannic*..... 361
Continental Iron Works..... 353
Correspondence..... 357
Curtain fixture improved*..... 355
Customers, peculiarities of..... 356
Dental apparatus*..... 355
Driven well patent sustained, the 352
Gas, natural, in Wayne Co., New York..... 357
Gases, liquefaction of..... 353
Gate, improved, Gross'*..... 354
Geese killed by lightning..... 360
Hay rake, improved*..... 354
Homes, own your own..... 352
Horn snake*..... 359
Inclined road up Lookout Mountain, Tenn..... 357
India rubber, vulcanized 356
Inter-state Commerce bill..... 352
Inventions, agricultural..... 362
Inventions, engineering..... 362
Inventions, miscellaneous..... 362
Inventions, index of..... 363
Ironing machine, hand*..... 356
Items of interest, many..... 353
Marine engine economy..... 356
Mother-of pearl fisheries..... 356
Notes and queries 363
Obernetter, J. B.... 353
Oil for boots and shoes 357
Patents, decisions relating to.... 357
Pen, electric, cheap..... 361
Petroleum American vs. Russian..... 360
Photographic notes..... 357
Pitcher plant, the*..... 359
Pneumatic letter tubes..... 352
Pump, double-acting*..... 356
Sash fastener, improved*..... 355
Snake, pine*..... 359
Steam trap, frost proof, for car heating*..... 354
Stock or hay frame*..... 355
Switch table and car replacer*... 354
Taxes on commercial travelers... 360
Victim of misplaced confidence.. 357
Water supply, New York*....351, 358
Workmen, why they are not fully employed..... 360
Wrench, improved*..... 356

TABLE OF CONTENTS OF

SCIENTIFIC AMERICAN SUPPLEMENT

No. 596.

For the Week Ending June 4, 1887.

Price 10 cents. For sale by all newsdealers.

PAGE

I. AGRICULTURE.—Soil Temperatures.—By D.B. PENHALLOW.—Experimental and observational examination of this question..... 9526

II. ELECTRICITY.—A 100 Horse Power Secondary Battery.—The great Regnier-Plante battery of the Paris City Hall, described in detail.—1 illustration..... 9521
An Equatorial Zone of almost Perpetual Electrical Discharge.—An interesting cosmic phenomenon described..... 9522
Apparatus for Testing Lightning Conductors.—A valuable invention for examination of lightning rod systems.—7 illustrations..... 9522
Zigang's Electric Trumpet.—A substitute for the ordinary bell call.—1 illustration..... 9522

III. ENGINEERING.—Improved Methods of Heating Railway Trains. By C. POWELL KARR, C.E.—Second paper of this series, treating of the twofold continuous or independent methods.—5 illustrations. 9518
New Tunnel Under the Thames River, London.—Method and details of constructing the new iron tunnel now building in London.—8 illustrations..... 9517
Notes on the Panama Canal.—By R. NELSON BOYD, M. Inst. C.E.—An important paper on the present condition of this enterprise, probable time requisite for completion.—2 illustrations..... 9519
The Archimedean Screw Pump.—Details of construction and capacity of these structures; their use in Holland.—1 illustration..... 9516
The Modern Marine Engine and Boiler.—Report of a paper by Mr. DOUGLASS, of Thorneycroft & Co., giving practical points on this subject..... 9516

IV. GEOLOGY.—Alaska Gold.—The prospects of placer working in Alaska discussed..... 9525

V. HYGIENE.—Climate in its Relation to Health.—By G. V. POORE, M.D.—Continuation of the third lecture of this series.—Phthisis, malaria, and mountain climates..... 9513

VI. MILITARY EQUIPMENT.—The New Uniform for the French Infantry.—Description of the uniform as recently adopted.—4 illustrations..... 9513

VII. MISCELLANEOUS.—A Grist Mill of 1819.—A curious antique mill worked by hand.—1 illustration..... 9525
Business Profits.—Abstract of a lecture before the Boston Society of Arts by Gen. Francis A. Walker.—The labor question and relations of labor and capital..... 9511
Going into the Poultry Business.—By P. H. JACOBS.—A review of the commercial aspects of poultry raising, and the difficulties to be encountered in it..... 9525

VIII. NAVAL ENGINEERING.—The Loss of the Channel Steamer Victoria.—The causes of this disaster.—The failure of the Pointe d'Ailly siren.—2 illustrations..... 9511

IX. PHOTOGRAPHY.—Person's Photographic Apparatus.—The use of gelatine plates instead of glass for negatives.—1 illustration..... 9523

X. PHYSICS.—M. Jouanne's Double Projection Photometer.—A new photometer, combining the principles of the Foucalt and Rumford instruments.—1 illustration..... 9523

XI. PHYSIOLOGY.—Acuteness of Hearing.—Experiments on this subject by Profs. Koenig and Du Bois-Reymond..... 9513
Alimentary Value of Albuminous Substances.—The results of recent experiment by Prof. Zuntz and Potthast..... 9516
The Similarity of the Phenomena of the Nervous Sleep, Hypnotism, Spiritualism, to the Physiological Action of Cannabis Indica or Hashish.—by A. L. Hodgdon, M.D.—A plea for the more scientific investigation of these questions..... 9513

XII. PRESTIDIGITATION.—A Trick with Dice.—An interesting piece of prestidigitation.—1 illustration..... 9512
Houdin's Magic Ball.—One of the famous magician's tricks explained.—1 illustration..... 9512
The Promblem of the Matches.—An experiment in "table magic."—1 illustration..... 9512

XIII. TOPOGRAPHY.—The Autographometer.—An apparatus for automatic topography.—The car, full mechanism, and illustrations of results.—5 illustrations..... 9524

THE DRIVEN WELL PATENT SUSTAINED.

On the 23d of the present month, the United States Supreme Court rendered two decisions in cases brought under the celebrated driven well patent, sustaining it, and adjudging the infringement of the patent as proved. For several reasons, these decisions are of widespread interest, both to laymen and to the professional world. An enormous number of driven wells have been constructed, and the royalties now collectible are very large, and those from whom they are to be collected comprise all classes of our people. The decision was rendered upon a reissue, on its face possessing expanded claims, and one applied for four years after the granting of the patent. The original patent bore the number 73,425, and was granted Jan. 14, 1868. The reissue number, 4,372, was dated May 9, 1871. Thus the decision includes the sustaining of a reissue, something that is not generally expected of the Supreme Court.

To understand what this amounts to, the history and claims of the original patent and of the reissue may be examined. The original drive well was devised by Norman W. Green, Colonel of the 76th New York Volunteers in 1861. In order to procure fresh water for his men, then encamped at Cortland, in this State, he drove a pointed rod into the ground until a water-bearing stratum was reached. Then he withdrew the rod, and introduced a tube into the aperture thus made, and through this tube or pipe the water was pumped. The claim of the original patent includes these three steps. In the reissue, the process later adopted is described and claimed, namely, the direct driving of a tube into the earth until the water supply is reached. This is the matter of the claim of the reissue, and in its coalescing of three steps into one a broadening of the matter seems visible. Yet this reissue has been sustained.

A further plea against the patent was made on the grounds of neglect to prosecute, and here Green was also fortunate. His first well was made in 1861, yet he only applied for his patent in 1866, some five years later. An effort was made to construe this into an abandonment of his invention to the public, but the attempt failed.

The ground taken by the Supreme Court on both these issues, ground favorable to the patentee, is of interest to inventors. It indicates a disposition on the part of the court to deal more liberally with patents. It had become almost an axiom that reissues could not be sustained, yet here is an instance where expanded claims and delay did not suffice to invalidate one.

Many of the recent attacks upon our patent system, that have been made of late years in Congress, have been to a great extent inspired by this famous patent.

If royalties under it were ever to be collected, it was clear that a vast number of individuals would be liable. The farmers throughout the country have put down drive wells, in many instances doing the whole work themselves. After enjoying the use of them for a number of years, it seemed almost an injustice to exact a royalty from the constructor or user. There was a simplicity about the device that seemed to remove it from the class of inventions. On consideration, this will be found a false view; and if the merits of the case be examined, it will be found that a most equitable decision has been rendered. The simplicity and obviousness of the device may seem extreme when once it is understood. But the fact that invention was required to devise it is clear, from the fact that it was never thought of until the year 1861. All the work of the inventors of past centuries had not led to the driving of a pipe into the ground for the procuring of water until Col. Green in his crude way did it in camp. This consideration should dispose of any doubts on the subject of inventors. The value of the method is in direct ratio to its simplicity. For the complex, expensive, and dangerous method of excavating wells, a method requiring expert labor and skill, was substituted a process that any intelligent person could carry out. The work of days was concentrated into a few hours, and the expense for material was almost entirely done away with. It would be difficult to find a more valuable improvement.

After using one for many years, the payment of a royalty might seem a hardship. But its justice will appear when it is remembered that but for such an invention every well in the country would be a dug or a drilled one, both involving much expense. If the saving to the people at large that it has effected could be computed, it would reach many millions of dollars. If one-tenth of this amount were collected as royalties, the owners of the Green patent would receive a princely sum. Owing to the wide and individual use of the drive well, it is safe to say that but a small fraction of royalties really due will ever be collected.

The favorable treatment of the patent by the Supreme Court, it is fair to assume, was caused by some such considerations. That tribunal is at liberty, and is obliged in many cases, to take cognizance of just such views as we have presented, in order to determine the originality of an invention, and the consequent extent of its claims. Utility and the revolution the invention effects in human industries are legal bases for judgment on the scope of patents.

How the Inter-state Commerce Bill Works.

One of the first complaints presented against the Inter-state Commerce bill came from the wool interest in California. It asked for a suspension of the long and short haul clause, in respect to wool shipments from that quarter, on the ground that, under the law, wool export from California to the East would be nearly, if not quite, impossible. Against this concession some of the wool merchants hereabouts have strongly protested. They have showed that in the past wool has been brought east from the Pacific coast for from fifty to sixty cents a hundred pounds, while the rate from points very much farther east has been as high as from $3.00 to $4.50 a hundred pounds. This is precisely what the law was intended to stop, and suspension of the operation of the law, for the purpose of permitting it to continue, would be defiant of the very intent and spirit of the act.

The Pacific railroads were built largely with public money; they were constructed at the cost of every citizen, not for the sole benefit of the people of the Pacific coast, but for the advantage of the entire body of people in every part of the country. For these corporations, possessing such advantages and clothed with such privileges, to use their power to injure—perhaps to ruin—the business of one class of individuals for the purpose of benefiting another class, is a shameless outrage which the government was required by the most ordinary considerations of decency and justice to suppress. These corporations have for years played into the hands of a sugar monopoly, which has robbed the people of California, and they have persistently favored certain interests, like this wool interest, at the cost of others. The new law puts its foot on such transactions. It makes compulsory something like fair dealing. California may, even yet, get as low a rate to Philadelphia for wool as Ohio gets, but to demand the sanction of the commission for a rate only one-sixth as great as Ohio has to pay is both audacious and impudent.—*Textile Record.*

Own Your Own Homes.

Every man, whether he is a workingman in the common acceptation of the word or not, feels a deep interest in the management of the affairs of the city, county, and State in which he lives whenever he owns a home. He is more patriotic, aptly says our worthy contemporary, the *Industrial Gazette*, and in many ways is a better citizen than the man who simply rents, and who has but little if any assurance of how long it will be before he can be ordered to move; to which may be added in many cases the saving of more money. Of course it requires some economy to lay up a sufficient amount of money to purchase and pay for a home; but this very fact, if properly carried out after the home is acquired, may be the instrument of furnishing the means to commence and prosecute a business upon your own responsibility. True, in some cases it will require more economy, perhaps, than we are now practicing. But the question with every man, and especially if he is the head of a family, is, Can he afford it? That is, can he afford to live up his wages as fast as he earns them, without laying up anything for the future? If he is the head of a family, he is obliged to pay rent, and it does not require very many years of rent paying to make up an amount sufficient to purchase and pay for a comfortable home. You have to pay the rent. This you say you cannot avoid and be honest. Well, you cannot be honest with your family unless you make a reasonable attempt to provide them a home of their own in case anything should happen to you. And the obligation to do this should be as strong as the one to pay rent or provide the other necessaries for the comfort of your family. When you own a home, you feel a direct interest in public affairs that otherwise you might consider were of little interest.

Pneumatic Letter Tubes.

Recently in the House of Commons Mr. Henniker Heaton asked the Postmaster-General whether he was aware that in Paris *cartes telegrammes* similar to post cards are issued of various values, inclusive of reply cards, which are collected every five minutes from special boxes and transmitted by pneumatic tubes to the general post office, and whether he would consider the advisability of introducing this system into London and other large towns. Mr. Raikes said: "I am aware that in Paris, as also in Berlin and Vienna, there are systems of pneumatic tubes, by means of which letters, telegrams, and *cartes telegrammes* are distributed. The question of adopting a system in London has been considered by my predecessors in office, and they came to the conclusion that it was not desirable, either in the interests of the public or of the post office, to establish it." The predecessors in office never have of themselves concluded that any new thing was desirable. They objected to everything, including the 6d. telegrams, which have proved a great success in every way. In Berlin, people have been able for years to send letter messages by about an hourly delivery by pneumatic post for 3d. In London we have to pay 6d. at least for a few-word telegram not much quicker.

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Many Items of Interest.

Fire and Water says that Horace Loomis, engineer of sewers, is building at Pier 29, East River, New York City, an outlet sewer of creosoted yellow pine. The sewer is circular, 4 feet in diameter and 541 feet long. The staves are 4 inches thick, placed radially, and are secured by galvanized iron hoops, 3 × ⅜ inch, tightened by two bolts passing through shoulders on the semi-hoops. The hoops are spaced about 4 feet apart, and the sections of the sewer butt squarely, the joint being covered by an 8 × ⅜ inch hoop. This sewer is supported upon caps bolted to the piles of the wharf previously in place, the joints of abutting sections being made to rest upon these caps.

Some system of constant artificial ventilation for sewers is, in the opinion of some of the most competent authorities, absolutely necessary, if we would be thoroughly rid of the deadly pest of sewer gas. Alanson Sibley, for ten years a member of the Detroit Board of Sewer Commissioners, advocates for this purpose a furnace and chimney of strong draught, at the mouth of the main sewer, to create a constant suction of the gases away from the houses and into a consuming chamber in the furnace.

Employing natural gas to advantage has been put in practice at Pittsburg, Pa., where at each of the fire cisterns the gas mains have been so arranged as to enable the department to connect a small hose to them, leading to the grate bars of the fire engines, when the gas is ignited and the engines kept running by it. By this means it has been found that at time of fire the engine can be fired with gas alone at a greatly reduced cost, and it is said that the supply and fuel wagons are to be dispensed with. Each cistern is provided with four connections.

Coal ashes are of some value as a fertilizer, especially to mix with clayey soil. But the best use to make of the ashes is for roads and paths. A good covering, over which a little soil is thrown, will soon form a hard, solid road. To make a better walk, prepare and level the bed, excavating it a few inches below the general surface. Pour on a coating of coal tar and cover it thickly with coal ashes. When this is dry, repeat with another coat of tar and ashes, and so on, until there are four coats of tar and as many of ashes. This, in a short time, will harden and make a walk as hard as stone.

A contemporary says of F. A. Sinclair's "Common Sense chairs," made at Mottville, N. Y., that they will hold together under the heaviest weight and the roughest treatment, and his rockers would almost make an old lady forget her rheumatics.

All elevators in buildings should be bricked in, or the sides of the well hole covered with metal plates, asbestos sheets, or some other non-inflammable material, to render them fireproof, and laws should be enacted making it compulsory on builders and property owners to make such provision for the safety of life and property:

But in buildings where no such provision is made, the following device has been suggested for preventing the spread of fire by way of the elevator shaft: It is proposed to erect a standpipe in one corner of the shaft with branches of perforated pipe, of smaller size, surrounding the well at each floor. The water can be turned into each of these perforated pipes simultaneously by pulling a lever at a point remote from the elevator, thus filling the shaft with a shower of spray, which will be likely to subdue the flame, unless the draught is very great and the fire too far progressed.

In several places in Dakota the artesian wells of 900 to 1,050 feet show pressures of 250 to 325 pounds. As there are no elevations within hundreds of miles to correspond to this, the Chicago *Journal of Commerce* asks the geologists, gasologists, or seismologists to tell what causes the pressure. Is it confined gas?

Statistics show that about twenty thousand people are annually destroyed in India by animals, and of these, nineteen out of twenty are said to be bitten by snakes. The number of human victims tends to increase, in spite of the fact that the number of wild beasts and snakes destroyed has doubled in the last ten years, and that the government reward paid for their extermination has risen proportionately. Next to venomous reptiles, tigers claim most victims. Ten years ago, wolves, mostly in the northwest provinces and Oudh, killed five times as many people as of late years; but the extermination of wolves seems to be going on rapidly. Leopards are the alleged cause of death to about two hundred human beings annually. Apart from the loss of human life, the returns show an annual destruction of fifty thousand head of cattle.

The work of converting the Washington Navy Yard into a gun foundry, authorized by the last Congress, has been commenced. Operations at present are confined to the old anchor shop, where the former appliances are being removed preparatory to its being fitted up for the construction of guns of 8 inch caliber and under. The floor will be concreted, lathe foundation erected, boilers and other improvements put in, and a foundation made for the 40 ton traveling crane to be erected for the handling of the guns. Draughtsmen are engaged on plans for the construction of a wing to the anchor shop for the manufacture of large guns of a caliber of 10 inches and upward. This building will be higher than the old anchor shop, as it is intended that the 110 ton crane to be used in the construction of the large guns shall have a hoisting height of 40 feet. But, adds the *Army and Navy Register*, it will be many months before the gun foundry is in full working order.

The following lines from *Power and Transmission* set forth pretty clearly the difference between a class of business as now conducted and gambling:

You go upon the board of trade,
Where margin merchants meet,
And take some little options
On January wheat;
You watch the little ticker,
Till the hands swing round the ring,
Then you find your little boodle
Has gone a-glimmering.
That's business.

You go into a faro bank
And buy a stack of chips,
And watch the cards come from the box
Which the dealer deftly flips.
When your head is dull and aching,
At the breaking of the day,
You see that fickle fortune
Has gone the other way.
That's gambling.

Careful experiments on the sense of smell in dogs have been made by George J. Romanes, who has communicated the results to the Linnæan Society of London. He finds that not only the feet, but the whole body of a man exhale a peculiar or individual odor, which a dog can recognize as that of his master amid a crowd of other persons; that the individual quality of this odor can be recognized at great distances to windward, or in calm weather at great distances in any direction; and that even powerful perfumes may not overcome this odor. Yet a single sheet of brown paper, when stepped upon instead of the ground, and afterward removed, was sufficient to prevent Mr. Romane's dog from following his trail.

Alkaline Varnish for Gelatine Negatives.

The *Br. Jour. of Photo.* says: Shellac, either bleached or unbleached, dissolves with great readiness in solution of borax or the alkaline carbonates, and when the solution thus formed is evaporated to dryness the residue is said, though not with perfect truth, to be insoluble. At any rate, it is sufficiently so to make a useful "waterproof" protective varnish for many purposes when the alkali is not an objection.

We have recently been experimenting with solutions of this character applied to gelatine negatives, and we are inclined to believe that, though perhaps not forming a practically perfect protection, such as we have indicated, they are likely to be used with advantage. The aqueous lac varnish is, as may readily be supposed, not so durable by a long way as the alcoholic, especially when applied to glass or other impervious substances; but our experience with it is that, when applied to paper or other surfaces capable of absorbing it, it forms a much tougher protection than the alcoholic solution when maintained on the surface. Thus, a gelatine negative varnished with aqueous solution of bleached lac presents a harder and less easily scratched surface than one protected by an alcoholic varnish of unbleached lac, the latter being itself naturally harder in the unbleached state. In the one case the lac is absorbed into the film of gelatine, in the other it is not; and though the first—the lac-impregnated film—is not waterproofed, or rendered non-absorptive, it is within certain bounds, dependent upon the strength of the varnish, capable of swelling and contracting under the influence of moisture without cracking in the manner an alcoholic-varnished film will do.

The solution we have found to answer best, after trying various combinations and strengths, is composed as follows:

Bleached lac	2	ounces.
Borax	½	ounce.
Carbonate of soda	1	drachm.
Glycerine	30 minims to 1	"
Water	20	fluid ounces.

Dissolve the borax and carbonate of soda in ten ounces of hot water, and throw in the lac broken into small pieces; place the containing vessel upon a clear fire or over a gas stove, and stir until the lac is dissolved.

When dissolved, allow it to cool partially, and filter through filter paper, after which the glycerine is added and the bulk made up to twenty ounces. Though now apparently perfectly clear, if it be set aside for a few days a sediment will be thrown down, when it may be again filtered, and then comes off beautifully bright and of a light amber color.

To use this varnish, the negative is finished, washed, and dried in the ordinary manner. It is then carefully dusted and either immersed in the varnish in a dish or the varnish is poured on to it and allowed to soak in for about a minute, after which the plate is closely drained. Under the action of the varnish the gelatine swells and absorbs the dissolved shellac, which, penetrating the film, renders a thick surface layer unnecessary. Indeed, it is preferable to drain as closely as possible. In two or three minutes the moisture will have been completely absorbed, and the surface of the negative takes a smooth, glassy appearance, showing the image in very slight relief. In the course of half an hour, at ordinary temperatures, the varnish will have dried to a perfectly smooth and beautifully even surface, resembling glass itself, and presenting extreme hardness to the touch. If a thicker solution be employed than the one given, the result is not so satisfactory.

If the film so varnished be plunged into water, it will swell just as if unvarnished; but if set aside to dry spontaneously, it will do so with perfect uniformity, and without any of the cracking so well known in connection with an alcoholic varnish. If heat be employed, or if the solution be stronger than that given, cracking will most probably occur.

Though this appears to form an extremely tough and *promising* protection, we are unable to speak as to its actual durability as yet. A second coating, however, of thin alcoholic lac varnish, or of collodion, would seem to offer an additional amount of permanency if the alkaline lac should show any tendency to deterioration.

Liquefaction of Gases.

A highly interesting series of experiments on the erst permanent gases has recently been successfully carried out by M. Olszewski. The more permanent gases have not only been liquefied at pressures averaging only 740 mm. by aid of excessively low temperatures, but the boiling points, melting points, and densities of these so-called gases have been determined at atmospheric pressure. The glass tube in which the condensation was effected was surrounded by a bath of liquefied ethylene, which could be caused to boil by reduction of its pressure, and, by use of a specially constructed air pump, was reduced in temperature to —150 deg. C. When this point was reached, the gas to be liquefied was admitted into the tube from a Natterer cylinder containing the gas at about 40–60 atmospheres pressure, and was readily liquefied. A hydrogen thermometer was used to determine the temperature of the liquid, and the boiling point of methane at atmospheric pressure was found to be —164 deg. C., that of oxygen —181·4 deg., nitrogen —194·4 deg., carbon monoxide —190 deg., and nitric oxide —153·6 deg. The melting point of carbon monoxide was also determined to be —207 deg., and that of nitrogen as low as —214 deg. M. Olszewski's nearest approach to absolute zero was —225 deg. for solid nitrogen. The density of methane at 736 mm. and —164 deg. was found to be 0·415, that of oxygen at 743 mm. and —181·4 deg. was 1·124, while that of nitrogen at 741 mm. and —194·4 deg. was found to be 0·885. The densities were determined—*Nature* says—by reading off the position of the liquid meniscus in the tube, volatilizing a portion by means of an aspirator, and again reading off the height of the column, the volume of the volatilized portion being measured by the amount of water running out of the aspirator.

J. B. Obernetter.

J. B. Obernetter, universally known as the inventor of many different and highly interesting photo-mechanical processes, died in Munich, Bavaria, during the night of April 12th last. For more than twenty-five years Obernetter directed his remarkable powers of study and observation to the art of photography. It was he who in 1864, while employed as chemist by Joseph Albert, of Munich, discovered and explained the method of photo-printing without the use of silver salts. Besides a positive paper, he invented several valuable and lasting improvements in the lichtdruck-gelatine process. His lichtdruck establishment is one of the largest in Europe. Hand presses alone are used in it, but the work executed is acknowledged to be equal, if not superior, to any other of a similar kind done throughout the world.

Obernetter's own life work will undoubtedly form the fittest and most enduring monument to his memory.

The Continental Iron Works.

Thomas F. Rowland, of Brooklyn, N. Y., has merged his business, generally known as the Continental Works, into an incorporated concern under the title of Continental Iron Works, which will continue the manufacture of gas holders and heavy special machinery as heretofore. The officers of the new company are: Thos. F. Rowland, president; Warren E. Hill and Chas. H. Corbett, vice-presidents; and Thos. F. Rowland, Jr., secretary and treasurer. The works in Brooklyn cover about four acres of land on the river front, and are the most extensive in the vicinity of New York.

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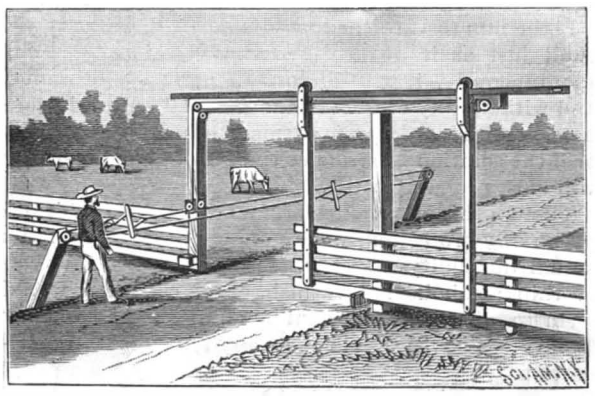
IMPROVED GATE.

The gate shown in the annexed engraving is not liable to be blocked by snow and ice, and may be readily operated from either side of the fence. The gate is hung upon rollers running in guides supported by posts. Attached to the gate is a rope, which is guided by pulleys, arranged as shown in the engraving, and is extended to inclined posts placed a short distance at either side of the forward gate post. It is evident that the gate can be opened and closed from either side by means of the handles carried by the extended ropes. To open and close from the same side, the handle is grasped and carried forward by the person as he approaches the gate, which, when reached, will be found opened wide. To close the gate, the handle is carried back, the gate being fully closed when the inclined post is reached. It will be observed that



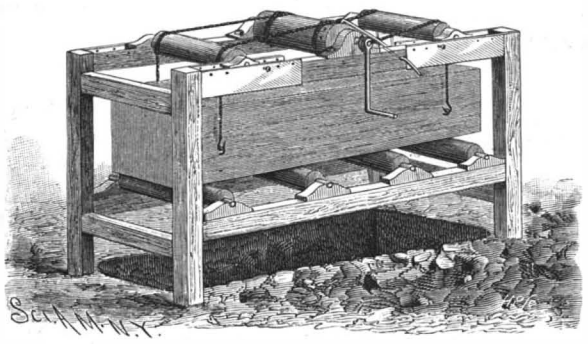
GROSS' IMPROVED GATE.

the operation of opening and closing, in every case, is in the direction in which the person would naturally walk or drive, and that it is accomplished simultaneously with the approach to or departure from the gate.

This invention has been patented by Mr. Thomas J. Gross, of Maple, Missouri.

DEVICE FOR LOWERING CASKETS.

By means of the device here illustrated, a large or small casket can be readily and safely lowered into a grave or vault. In the upper edge of the lower side rails of the rectangular frame are journaled removable rollers, and attached to the inner and outer faces of the upper rails are metal plates which project above



BEATTIE'S DEVICE FOR LOWERING CASKETS.

the top of the rails, and are formed with registering apertures to receive pins. In the guides thus formed slide journal boxes carrying rollers; the pins serve to fix the positions of the boxes. In the middle of the top of the frame is journaled a drum, operated by a crank, and to which are attached ropes arranged as shown in the engraving. The drum is locked by a pawl. In operation, the frame is placed over the grave and the casket entered upon the rollers. The top rollers are then adjusted toward the center or ends, according to the length of the casket, and the hooks at the ends of the rope are engaged with the handles. The drum is then turned so as to slightly raise the casket and permit the removal of the lower rollers. The casket can then be lowered into the grave, the hooks automatically disengaging themselves as the casket reaches the bottom.

This invention has been patented by Mr. James H. Beattie, of Conway, Kansas.

PORTABLE SWITCH TABLE AND CAR REPLACER.

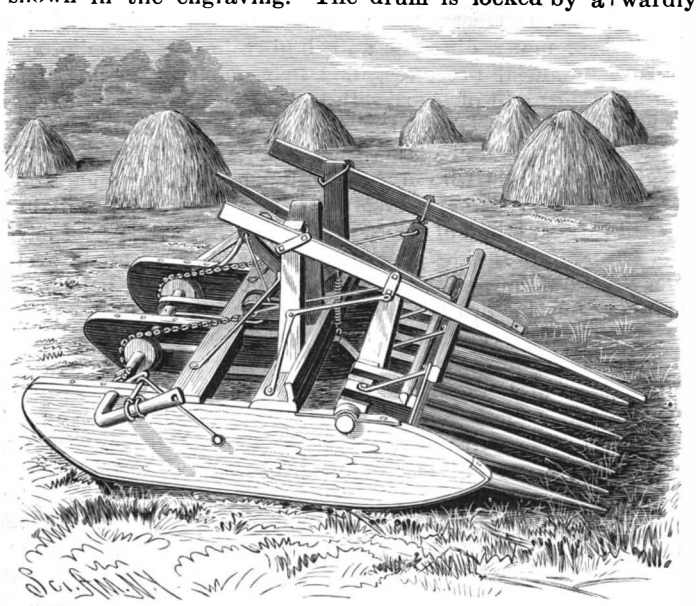
The object of the invention here illustrated is to provide an improved apparatus for facilitating the replacing of cars and locomotives on the tracks in case of derailment. The platform shown in the upper part of the plan view, Fig. 2, is formed with a wing beveled from the platform downward, so that its lower end will rest on the ties when the platform is on the rail. The platform is provided with downwardly projecting side flanges, parallel with which are ribs provided with lugs resting against the head of the rail, which enters between the flange and rib, and is held in place by a screw passing through the flange. At the side edges of the upper surface of the platform are two longitudinal ribs. In the other platform, shown near the bottom in both views, the ribs form a V-shaped figure, at the apex of which is pivoted a tongue to slide over the wing, which is formed with two side flanges on its upper surface.

The devices are used in the following way: They are placed on the ties at the same sides of the two rails in such manner that the platforms rest on the rail heads and the ends of the wings on the ties, the device having the tongue being on the outer side of the rail. The tongue is then swung against the outer flange to guide the wheels running up the wing toward the rail. The treads of the wheels run on the ribs, and the flanges on the platforms and wings. At the ends of the platforms the flanges drop into notches and the wheels drop upon the rails. The devices can be reversed and used on either side of the rails, and by means of the fastening screws are clamped firmly to the rails, so that they cannot slip. The replacers are intended to be carried on all trains.

This invention has been patented in the United States, Canada, England, France, and Belgium by Mr. Arthur Durieu, of 109 Canal Street, New Orleans, La., who may be addressed for all further particulars.

IMPROVED HAY RAKE.

This rake is so constructed that it can be moved in either direction without changing the point of attachment of the horses employed to drag the rake, the parts being so arranged that in reversing the direction of travel, after gathering the load, the points of the rake teeth will be automatically raised. The main frame consists of two side runners rigidly connected together. The head of the rake proper is made up of a rigidly connected framework consisting of a crossbar to which the rake teeth are attached, and the rounded ends of which are journaled in bearings formed near the forward ends of the runners. Journaled in the rear parts of the runners is a shaft whose extending ends are bent forward, and which carries two eccentric wheels, to which are secured chains extending forward to connect with rods secured to standards carried by the shaft or axis of the rake head. Pivotally connected to the rake head is a latch which serves to hold the teeth in a raised position, but which may be automatically released by a bell crank lever, to the rear end of which is connected a chain extending downward and under a sheave, the end of the chain being secured to the rear shaft. Upon the center crossbar are two standards, to which are attached forwardly extending arms, which serve to hold the load of hay upon the rake after the points of the teeth have been raised and during the time that the load is being drawn to the stack. To operate the rake, a horse is hitched to each of the arms of the rear shaft. After a load has been obtained, the horses are turned around so as to face in the opposite direction, the arms of the shaft then being moved toward the rear. This movement of the shaft raises the rake teeth, which are prevented from falling accidentally by the latch. As the teeth are raised, the load is held by the arms and prevented from falling or spilling from the rake. Upon reaching the stack, the teeth are allowed to drop into position to deliver the load.

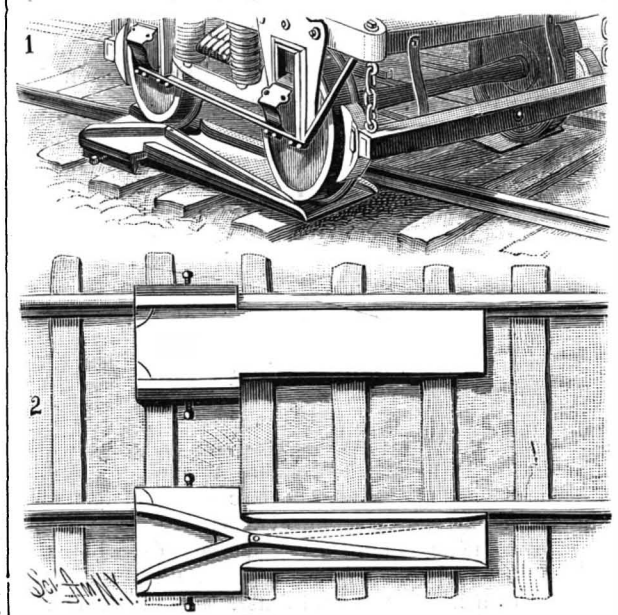


SPENCER'S IMPROVED HAY RAKE.

This invention has been patented by Mr. Joseph M. Spencer, of La Plata, Missouri.

A FROST PROOF STEAM TRAP FOR CAR HEATING.

The illustrations herewith represent a perspective and a sectional view of a recently patented frost proof steam trap, designed for use on railway cars and in other exposed places. It consists of a shell with two outlets, one in the bottom and the other in the top, each having a valve and a thermostat for operating it. Its size is 5 by 8 in., and the weight is 30 lb. The valve is in each case automatically controlled by the temperature in the trap body. When steam is shut off, the trap cools, opening first the lower outlet wide, and at 170° or less opening the upper outlet, creating an inlet for air and allowing all the water in the trap to fall out instantly. When cold, both valves are wide open, a stiff spring forcing them from their seats and pushing the flexible surface of the expansion vessel back to its furthest limit. Steam being let on, all the air and water passes out freely until the temperature in the trap approaches the point at which it is set to close. The valve controlling the upper outlet is set to close at 180°, closing before steam reaches the trap,



DURIEU'S PORTABLE SWITCH TABLE AND CAR REPLACER.

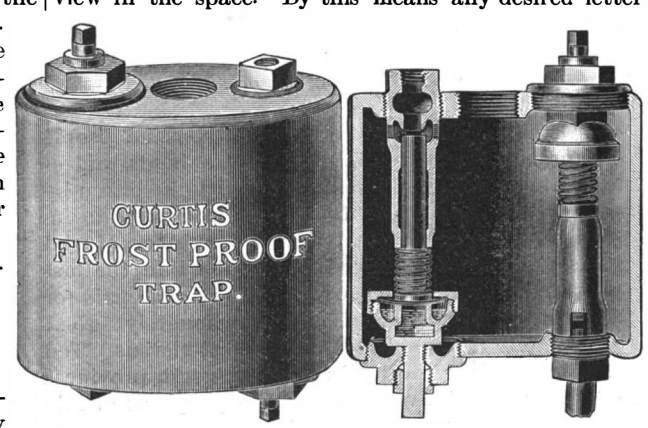
leaving the lower outlet, set at 210°, to control the flow of condensation. The inlet is tapped for 1½ in. pipe, and the outlet ½ in. This steam trap is made by the Curtis Regulator Company, of Boston, Mass.

ALPHABET CASE.

This case is designed as a toy to be used for the amusement and instruction of children. In the opposite ends of the case are semi-cylindrical tape supports, arranged with their convex sides outward. Endless tapes, carrying letters, figures, or characters, extend around the supports, in the inner faces of which are inserted the ends of guides, which serve to keep the tapes parallel with each other. The central portion of the outer edge of each guide is cut away. Across the top of the case are secured strips, between which is a space through which one letter upon each tape may be displayed. The tapes are formed with apertures for receiving the point of a pencil for sliding the tapes around their supports to bring the desired letters into view in the space. By this means any desired letter may be displayed, and as each tape is provided with a blank space, only as many letters as are required need be brought into view. The device is used in arranging letters to spell short words, after which the words are to be copied on a slate to fix them in the memory.

SAFFORD'S ALPHABET CASE.

This invention has been patented by Mr. Albert M. Safford, P. O. box 1329, Providence, R. I.



A FROST PROOF STEAM TRAP FOR CAR HEATING.

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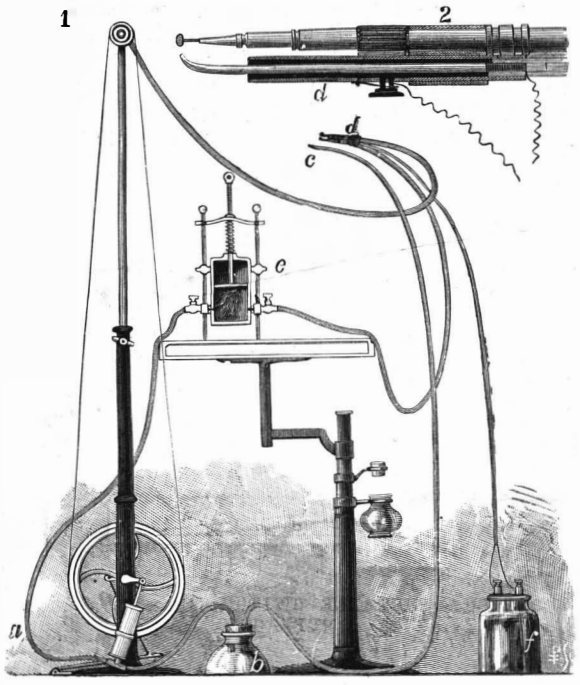
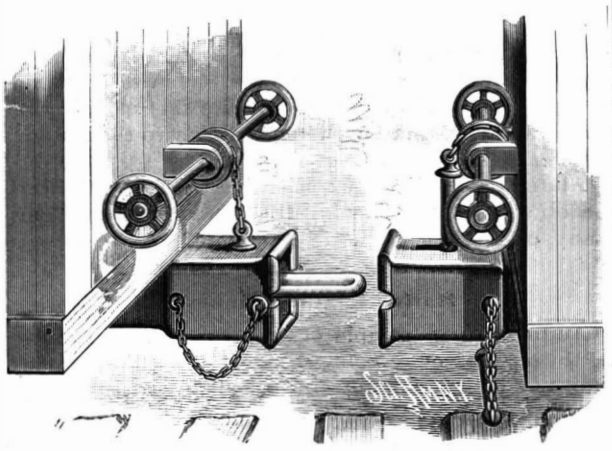
DENTAL APPARATUS.

The apparatus herewith illustrated is designed to remove the saliva from the mouths of patients during dental operations with a dental engine. To the main shaft of a dental engine, *a*, of the ordinary construction is connected the piston of an exhaust pump, to which is attached a rubber tube connecting with a bottle, *b*, forming a saliva receptacle. When the air is exhausted from the receptacle, the vacuum created causes the saliva to pass from the patient's mouth through the



PARSON'S DENTAL APPARATUS.

tube, *c*, to the bottle. Leading from the air discharge outlet of the pump is a tube connecting with a close air receptacle, *e*, into which the air from the pump is delivered, and in which it is held under compression and allowed to pass at the will of the operator to and through a flexible tube united with the arm, *d*, of the dental engine, thereby conveying air to the tooth being operated upon. In order to heat the air before it leaves the tube, the latter is provided at its outer end with a mouthpiece, shown enlarged in Fig. 2, composed in



NEWTON'S IMPROVED CAR COUPLING.

part of a small metal tube, around which there may be a coil of wire arranged, so that when a current of electricity from the battery, *f*, is passed over the tube, it becomes warm or hot. as desired, and heats the air passing through the tube. Around the metal tube is placed a suitable non-conducting material. This electric air-heating mouthpiece need only be about the thickness of a pencil and about two inches long. The temperature may be varied by changing the number of cells or by changing the material of the tube. The heated air discharged from the tube may not only be used on the tooth to ease pain, but may also be used to blow away chips or dust, or to dry the cavity or for atomizing purposes. The receiver, *e*, consists of a cylinder fitted with a piston, which is forced down by a spring. Air entering the receiver from the pump forces the piston up against the tension of the spring, thus retaining in the vessel a supply of compressed air for future use. The piston rod is graduated, so that the amount of pressure may be readily determined.

This invention has been patented by Mr. Horace W. Parsons, of Wamego, Kansas.

IMPROVED CAR COUPLING.

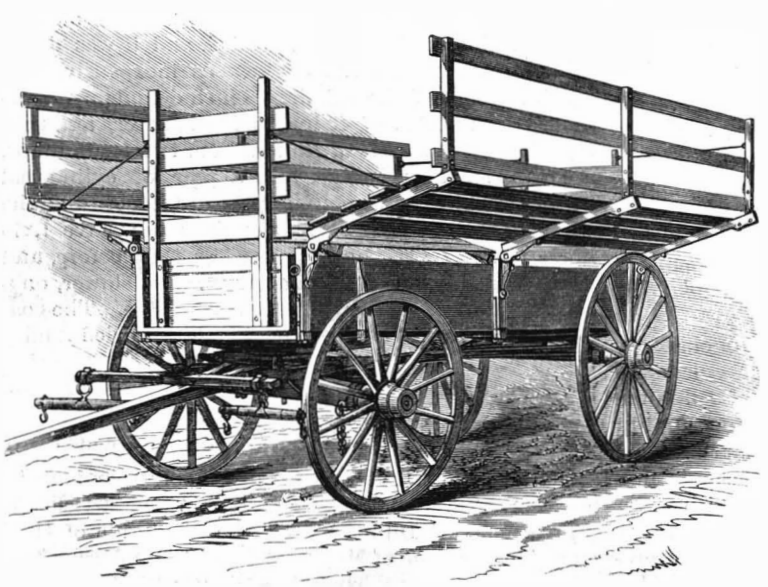
The drawhead is formed with a link opening, at the bottom and rear end of which is a transverse offset, which constitutes a support or seat for one end of the link when in position for coupling. To each side of the drawhead is attached a chain supporting a transverse bar, and recesses are cut in the front edges of the drawhead, the top edges of the recesses being in alignment with the top of the support or seat. When the link is in position to couple, the swinging bar is placed in the recesses across the link opening, and the link is thereupon seated, at the inner end upon the offset and near its outer end upon the transverse bar. The link is thus held in a horizontal position above the lower surface of the link opening, and is free to enter the opposite drawhead. Journaled across the end of the car is a shaft having a hand wheel at each end and at the center a drum, to which is secured a chain, attached also to the coupling pin. The chain is of such length that one turn of the hand wheels effects a complete disengagement of the pin from the link. In operation the link is held horizontally in the drawhead of one coupler. In the opposing coupler the swinging seat bar is allowed to hang beneath the drawhead, the pin being held above the link opening. As the drawheads come together and the link enters the empty drawhead, the pin thereof is dropped through the link, and as the drawheads are drawn apart the seat bar, utilized to support the link in one drawhead, automatically drops out of the recesses and swings beneath its drawhead. When the coupler is used with an opposing coupler of greater height, an upward inclination is given to the link by removing its inner end from the offset and allowing it to rest upon the floor of the link; opening, the outer end resting, as usual, upon the seat bar.

This invention has been patented by Mr. Joseph Winsor Newton, of Cranston, R. I.

STOCK OR HAY FRAME.

This improved frame or wagon box, which can be used for stock or for hay, facilitates the loading of animals into the wagon for transportation. The floor of the wagon box is secured on cross pieces, to the ends of which are held short uprights, hinged to the upper ends of which are other uprights carrying longitudinal rails. The side pieces thus formed are arranged to swing outward. The hinges are each formed of two sections, each having a centrally apertured disk, having radial ratchet teeth on the sides facing each other. Before swinging either side piece outward, it must be moved in the direction of its length to disengage the teeth of the disk; and when it has the desired inclination, the teeth of the disks are engaged again, and are held together by coiled springs around the pintles connecting the sections. The side pieces are braced by rods as shown, and on them are placed other side pieces, thus forming a rack adapted to hold a large quantity of hay even during windy weather. The end boards of the box are provided with uprights, to which cross slats are fastened.

To load stock into the box, one end board is removed and a gang plank is placed in an inclined position, resting on the box and on the ground. The upper sides of the rack are then removed, and placed on the gang plank, to form sides. The animal is then driven on the plank, and gates, running upon rollers along the sides, are closed; then, by means of a suitably arranged rope leading from the gates to a crank shaft, the gates are pulled upward along the plank, forcing the animal upward and into the box. The stock loader can be adapted for use on railroads or in private stock yard chutes.



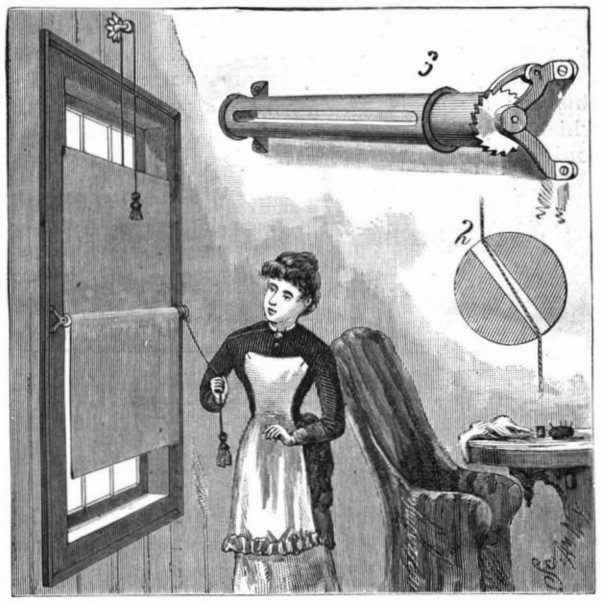
STOCK OR HAY FRAME.

For all further particulars concerning this invention, the Carrington Stock Rack and Hay Frame Co., of Clay Center, Kansas, should be addressed.

FOR a good receipt for making antique brass, dissolve 1 ounce sal ammoniac, 3 ounces cream of tartar, and 6 ounces common salt in 1 pint hot water; then add 2 ounces nitrate of copper, dissolved in a half pint of water; mix well, and apply it repeatedly to the article by means of a brush.

IMPROVED CURTAIN FIXTURE.

This curtain fixture is designed to afford facilities for shading either the upper or lower half of a window, or the whole of it, at will. The roller (Fig. 3) is provided with a longitudinal slot through which the curtain passes, as shown in Fig. 2. In the other figure the curtain is shown as applied to the window. By pulling down the upper cord, the curtain will be entirely unwound and the whole window covered. Then it can be drawn up through the slot until the upper half only of the window is covered. Again, by dropping it the whole window will be covered a second time. By partially rolling it, the center of the window will be screened. If the shade is pulled well down, and then rolled up by the lower cord, the lower half of the window will be covered. By a similar manipulation, the screening can be confined to the upper half. The tassels at the ends of the cords are weighted, whereby



BELL'S IMPROVED CURTAIN FIXTURE.

the shade may be raised or lowered as desired. For instance, when the tassel held by the operator is lifted, the weight on the other cord lifts the shade by its own gravity. Thus any portion can be screened, and a very perfect fixture is presented for use in all houses.

This invention has been patented by Mr. Charles Bell, of Old Tacoma, Wash. Ter.

IMPROVED SASH FASTENER.

The invention here illustrated has been recently patented by Mr. William R. Abrams, of Ellensburg, W. T., the object being to provide a simple and efficient portable window fastener that can be applied to any window, and which will prevent either sash from being moved and from rattling. The plate forming the body of the fastener is wedge-shaped at one end and pro-

ABRAMS' IMPROVED SASH FASTENER.

vided with a hinged piece at the opposite end. Near the hinge is secured a plate, which is bent twice at right angles and formed with pointed ends inclined in opposite directions. Also secured to the plate, but projecting in the opposite direction, is an arm. The hinged piece has a slot, and one of its surfaces is roughened for engagement with the roughened surface of a bar provided with a screw-threaded stud, which passes through the slot and receives a wing nut, by which the bar is clamped to the end piece. One end of the bar is bent at right angles to form an arm, which is beveled on opposite edges to form sharp angles for engaging the sash and window stop. The opposite end of the bar constitutes a handle, and to it is attached a chain. The fastener is applied to a window by inserting the wedge-shaped end of the main plate between the lower sash and window casing, the hinge piece being folded back on the plate, and then pressing the pointed ends

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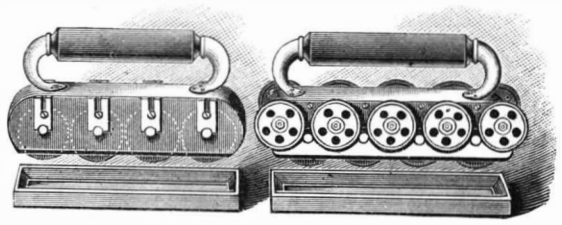
into the casing. The bar is then arranged as shown in the engraving.

The upward movement of the lower sash is prevented by the inclined surface of the main plate and by the arm, while the downward movement of the upper sash is prevented by the engagement of the edges of the angled end of the bar with the sash and parting strip. It is obvious that, with this fastener, a window which is partly open at the top and bottom may be secured so that it cannot be opened further.

HAND IRONING MACHINE.

The invention illustrated in the cut has for its object the suppression of injurious friction in sad irons. While the suppression of this trouble makes the iron peculiarly applicable to the treatment of delicate goods, such as lace curtains and embroidery, it is evident that the saving in labor effected by it is not of less importance. The body of the iron incloses a number of smooth rollers journaled either in suitable boxes or bearing against friction rollers or adjustable bearings. They are to be heated on an ordinary stove. For this end a shallow box or tray is provided, within which they are placed when heating. Two styles of construction are shown, but it is evident that many



CORBETT'S HAND IRONING MACHINE.

modifications may be used, such as steam for heating the rollers. The apparatus may be mounted in a frame with an adjustable pressure device.

This invention has been patented by Frank Corbett, No. 354 Bowery, New York City, N. Y.

Mother-of-pearl Fisheries in the Red Sea.

Consul Jago, of Jeddah, says that the mother-of-pearl fisheries extend the whole length of the Red Sea, from El Wedj on the north to Aden on the south. The principal grounds are in the neighborhood of Suakim, Massowah, and the Farsan Islands. About 300 boats are employed, the majority belonging to the Zobeid Bedouins, a tribe of Arabs inhabiting the coast line between Jeddah and Yambo. About 50 boats belong to Jeddah, and two or three to Confida, Cameran, and Loheiha. They are open, undecked boats, of between eight and twenty tons burden, carrying a large lateen sail, manned by crews varying between five and twelve men, and each provided with a number of small canoes, which are imported specially from the coast of Malabar.

There are two fishing seasons during the year, one of four months and one of eight months, during nearly the whole of which the boats keep the sea, the crews living on board, returning to their homes for short periods of two to four weeks. The crews, composed principally of black slaves, are paid by share of the produce of their fishing, the owner of the boat taking one third, the remaining two thirds being divided among the former, after deducting the cost of food consumed by them during the voyage, and which consists of dhourra, rice, and fish, with sometimes a little ghee and dates as a luxury. Fatal accidents are said to be unknown, and the men are remarkable for their strength and good health. They dive between the ages of ten and forty, and the practice is said to have no ill effects.

The fishing takes place in the neighborhood of reefs, the boat anchoring at a certain spot, whence the crew proceed to fish in their canoes in the vicinity. Operations are conducted only in calm weather, when the shell can be discovered by the eye at a depth varying between seven and fifteen fathoms. Of late years, to assist the eye, empty petroleum tins, with the ends knocked out and a sheet of glass inserted in one end, have been used. The tin, with the glass end below, is submerged a little in the sea, and the discovery of the shell thereby facilitated. During the last ten years the find is said to have diminished ten to twenty per cent in quantity, owing to dearth of shells. The value of the total harvest is estimated at 120,000 to 170,000 dollars annually, the dollar varying in value between 3s. and 3s. 6d. The short season of four months, which used to average between 40,000 and 50,000 dollars, only realized, in 1886, 25,000 dollars.

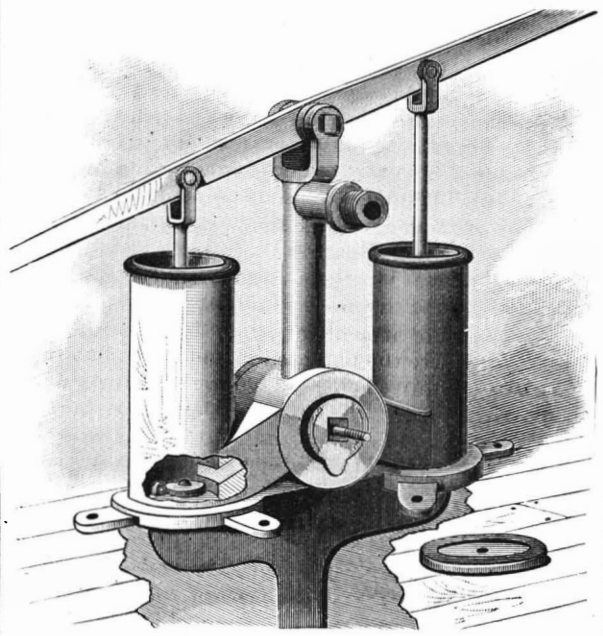
Formerly, all the produce of the Red Sea was brought to Jeddah for sale and export, but recently, owing to fiscal and custom house restrictions, only about one-fourth now goes there, the remainder going to Suakim and Massowah. Shells imported at Jeddah for sale are disposed of by public auction in heaps of about half a hundredweight each. As preliminary inspection is not allowed, the bidding is purely speculative, and bidders have to take account of dirt, coral excrescences, and inferior shells. Prior to exportation the shells are sometimes cleaned to remove the coral and dirt, and are then packed in barrels. Up to ten years ago, all shells brought to Jeddah for sale were shipped by natives to Cairo, to be sold there. Now, however, the bulk goes to Trieste, a small quantity to London, and a little to Havre; and a few of the finest and largest shells are purchased for exportation to Bethlehem, where they are engraved and sold to pilgrims.

The Jeddah shell is considered in Europe inferior to that exported from Suakim and Massowah, owing, it is said, in many instances, to the yellowish tint of the former and the fact that many of the shells have a greenish tint round the edges. Some ascribe this to the excessive dampness of the climate of Jeddah.

With regard to the origin of the shells, the following distinctions are made: *Dah al ak-i* shells, found on the group of islands of this name, situated along the African side of the Red Sea; *Barr-adjem-i* shells, found along the same coast, north of the Khor or inlet of Suakim; *Farsan* or *Yeman-i* shells, brought from the Farsan group of islands, on the Arabian side of the Red Sea; *Shebak-i* shells, from the banks between Confidah and Leet; *Sham-i* shells, from El Wedj down to Hassanee Island, on the Arabian side, and found in the neighborhood of Kossair, on the African side. Consul Jago says, in conclusion, that the *Sham-i* is the best, and the *Yeman-i* the most inferior quality.

DOUBLE-ACTING PUMP.

The cylinders of this pump are cast on a base provided with a suction pipe having two branches, which open respectively into the bottom of the cylinders, and are each covered with a hinged valve, opening upwardly. In each cylinder is a plunger, connected by a rod with a beam of any suitable form. Between the cylinders is a central valve seat, connected at each side by channels with the cylinders. In the valve seat is placed a check valve composed of two parts, each having a dovetailed facing, and both forming at their lower ends a half round projection, which fits a corresponding groove formed in the bottom of the valve seat. The projection constitutes a pivotal center, upon which the valve swings either to the right or left, as the case may be, so as to establish alternately a connection between either of the cylinders and the outlet pipe, which communicates with the top of the valve. The side openings of the valve seat are closed by covers seated on gaskets, to form water-tight joints, and held in place by a bolt passing through the center of the valve. When the pump is set in operation, the upward motion of each plunger causes the liquid to flow into the cylinder. The downward motion of the plunger seats the valve at the lower end of the cylinder and forces the liquid against the central valve, which is then thrown to the opposite side, thus permitting the liquid to flow



VAN PELT'S DOUBLE-ACTING PUMP.

through the outlet pipe. A constant motion of the pump beam produces a continuous outflow of the liquid through the pipe. The facings of the central valve are of composition, and can be easily replaced when worn out.

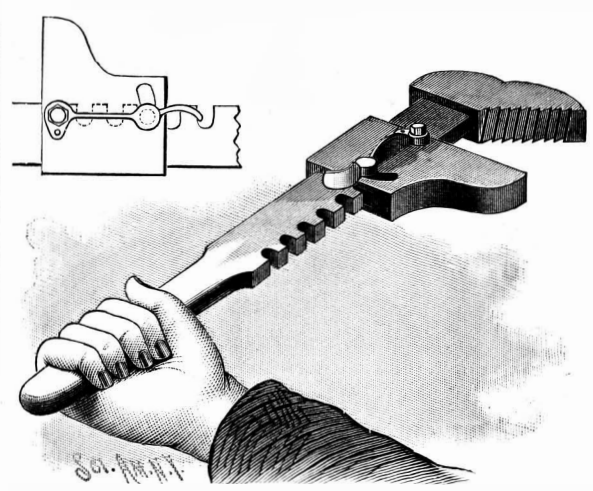
This invention has been patented by Mr. John K. Van Pelt, of Birmingham, Ala.

Vulcanized India Rubber.

According to M. Balland the gradual loss of elasticity frequently observed in articles made of vulcanized India rubber is due to the slow formation of sulphuric acid by the action of atmospheric moisture on sulphur present in the rubber. He recommends that the action of the acid should be prevented by occasional prolonged washing of the article with water or with water rendered slightly alkaline (*Jour. Pharm.*, April 15, p. 417). In this way he has been able to maintain drainage tubes in a supple condition for a considerable time.

IMPROVED WRENCH.

The stock or shank of the wrench is provided with a fixed outer jaw, the face of which is serrated to form teeth to give hold or bite on the pipe or article being worked. The teeth are cut oblique to the sides of the jaw, for the purpose of securing a better hold on the pipe. The movable jaw is fitted to slide along the shank, and is locked in its different positions by means of a spring thumb lever catch, a side pin on which engages with any one of a series of cross grooves cut in that portion of the shank along which the jaw is adjustable. The catch is constructed with a thin or reduced body part, whereby it is made elastic and automatically closing in itself. Consequently, it does not require an independent spring to cause its pin to engage with the grooves, and is much less liable to get



IMPROVED WRENCH.

out of order than when a separate spring is employed. The catch is secured to the jaw by a plain stud arranged eccentrically to the main screw bolt. The eccentric stud prevents the catch from turning on its bolt. The free end of the lever forms a thumb piece by which the catch may be lifted out of engagement with the grooves when it is necessary to change the adjustment of the jaw. The pin which engages with the grooves moves in and is guided by slots passing through both sides of the jaw. It is evident that when strain is put upon the movable jaw, as in use, the back of the groove with which the pin engages will take the main strain and bear upon the center of one side of the pin, and the front walls of the slots will bear in a reverse direction upon the opposite side of the pin, thus giving great strength and stability to the locking device.

All further particulars concerning this invention can be obtained by addressing the American Saw Company, of Trenton, N. J.

Marine Engine Economy.

An interesting example of the comparative economy of the old and more modern styles of oscillating marine engines was lately furnished by an instance quoted by Mr. J. W. T. Harvey before the engineering section of the Bristol Naturalists' Society. The Juno was originally worked with a jet condenser; after a time this was replaced by a surface condenser, and finally the engines were compounded. Thus we have the same vessel working under three different conditions, and any alteration of coal consumption must be due to the changes in her machinery. The engines originally worked at 30 pounds per square inch and indicated 1,605 horse power; they drove the vessel at 14·1 knots, using 92 tons of coal per voyage. Subsequently new boilers and a surface condenser were fitted to the ship, the pressure still being 30 pounds; the same horse power and speed were then maintained with a consumption of 84½ tons of coal per voyage, a saving of 7½ tons, or 9 per cent. As competition in the carrying trade became keener, this coal consumption could not be afforded, and it was determined to compound the engines as inexpensively as possible. One of the existing 66 inch cylinders was replaced by another of 40 inches in diameter, and this, together with two sets of link motion, two feed pumps, a steam starting engine, and a pair of cylindrical boilers working at 80 pounds pressure, constituted the whole of the new parts. The engines now gave 1,270 horse power, or 335 horse power less than before, and drove the ship at 13·4 knots, or 0·7 knot slower, on a consumption of 49 tons of coal per voyage. The coal consumption per horse power therefore varied under the three conditions as 100 : 91 : 67. The consumption per voyage varied as 100 : 91 : 53.

A Correction.

Our attention has been called by a correspondent to the word "systematic," occurring in the article on "Treatment of Diphtheria by the Bichloride of Mercury," in our issue of May 7, 1887, pp. 288 and 289. The phrase containing it should read: "but is swallowed, and systemic infection furthered."

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Correspondence.

The Spread of Cholera.

To the Editor of the Scientific American:

With reference to your account of the introduction of Asiatic cholera into Chili, permit me to point out that water is not an unusual, but most common, vehicle for the spread of the infection. It is, I suppose, unnecessary to remind you that if the disease were to reach San Francisco, nothing could be better adapted to carry it across the continent and to spread it everywhere than the conveniences attached to our railroad passenger coaches. C. J. G.

Oil for Boots and Shoes.

To the Editor of the Scientific American:

Referring to No. 20 of Notes and Queries, issue May 14, I can say from experience that if C. L. will use a vegetable oil—say castor oil—for softening the uppers of his shoes, he will have little trouble in polishing them the next morning. It is the animal oil that troubles the user in polishing.

I have used castor oil for ten years past for this purpose, and find no ill result from its use. Let me caution C. L. to keep grease of all kinds away from rubber or sewed work of shoes or boots. A. S.

Oil for Boots and Shoes.

To the Editor of the Scientific American:

In your replies to correspondents, May 14, 1887, No. 20, C. L. asks: "What oil can I use to rub into my shoes at night, so that I can polish them in the morning by using ordinary shoe blacking?"

I have for a number of years obtained great satisfaction from using crude castor oil. The method to be observed is about once a month to thoroughly shine the shoes in the evening, and immediately after to apply the oil with a soft paint brush. Set aside until morning, when it will be found that the oil has soaked into the leather, making the shoes soft and pliable and the shine perfect. The following morning the shoes may be as well polished as though they had not been softened. I have found my shoes last nearly twice as long, since I adopted this method, and they are capable of a higher polish. DR. H. A. WILSON.

A Victim of Misplaced Confidence.

He was an agent for a step ladder. Not an ordinary step ladder, but a combination, convertible, extensional, generally utilizable step ladder. He greeted the lady of the house at a White street residence, last Friday afternoon, with a winning smile, as she opened the door in response to his knock, and proceeded at once to expatiate and illustrate the many advantages of his step ladder over the ordinary step ladder. It was just what every model housekeeper could not possibly do without; that fact any intelligent woman could see at a glance. It could be used in cases where every other step ladder could not; an attachment here made it a most comfortable chair for a grown-up person, another attachment there converted it into a high chair, and still by other combinations it could be made into an ironing table, a cradle, a drawing room whatnot, or a garden wheelbarrow. And then it was indestructible, and would last a family a lifetime. Why, it would bear the weight of four men. That was where the agent made the greatest mistake of his life. To prove its strength he gave a spring in the air and sat down on top of it hard. That is, he meant to. For as he landed, there was a terrific crash, and the air was filled with flying bits of wood that made the lady of the house think of the time that she was in the coal cellar when a load of kindling wood was dumped in the cellar. Then there was a dull, sickening thud as the agent landed flat on his back on the piazza. She laughed as he slowly crawled from beneath the wreck and gazed ruefully about for a moment. Then he said, "You can use it for kindling wood," and walked sorrowfully away.—*Orange Journal.*

Inclined Road up Lookout Mountain, Tenn.

Probably one of the most famous engagements of our civil war was Hooker's famous "battle above the clouds," on Lookout Mountain, near Chattanooga, Tenn. The place thus made historical is one of the most sightly on the continent, and has attracted many visitors, so that a small park has been laid out on the small available space on the summit, and buildings are being erected for the accommodation of the public. On this account an inclined railroad has been built covering the most tedious part of the ascent. The grade averages 1 foot in 3½, and the road is 4,300 feet long, making a total rise of about 1,200 feet. The cars are drawn by steel cables of 1 inch diameter, the car being calculated to carry 35 people on each trip, and to make the ascent in five or six minutes. The track has two curves, one to the left and one to the right, and from the point of the mountain where the inclined road terminates, a narrow gauge road, a mile and a quarter long, covers the more gradual ascent to the summit.

PHOTOGRAPHIC NOTES.

Copying Engravings and Drawings on Dry Plates.—In making negatives of line subjects on dry plates, it is frequently difficult to obtain clear lines, since the latter will, to a certain extent, clog up during the later stages of development.

The method lately recommended by the *British Journal of Photography*, of first immersing the plate in a bath of gallic acid just prior to development, greatly improves the negative and secures greater density.

The plate is left in the gallic acid solution—water one oz., gallic acid two grains—for half a minute. It is then transferred without washing to the developer, as follows:

Pyrogallol solution (10 per cent)	40 minims.
Potash solution	2 drachms.
Water	1 oz.

The potash solution is prepared as follows:

Carbonate of potash C. P.	360 grs.
Sodium sulphite	360 grs.
Water	6 ozs.

Referring to the development, the directions to be observed are that in half a minute or so the image commences to appear. Watch carefully, and when the details in the darkest part of the engraving acquire tolerable strength, add five minims of a sixty grain solution of bromide of potassium and go on until sufficient density is acquired.

In case the development is retarded too much, a few drops of an ordinary diluted ammonia solution may be added, which will hasten the action of the developer. As a rule, it is better to slightly overexpose. Then the image will develop more uniformly and quicker, and the need of forcing the development be prevented.

Six times the normal exposure has not produced any signs of the plate being overdone, showing plainly that the gallic acid exerts a restraining influence of much value. As a remedy for overexposed plates generally, we advise, as soon as the fact is discovered, the pouring off of the developer and the immediate flowing over with the weak solution of gallic acid above mentioned, letting it remain for a minute or two. Then reapply the developer. Density will thus be easily acquired.

DECISIONS RELATING TO PATENTS.

Supreme Court of the United States.

BRAGG *et al. vs.* FITCH *et al.*

Appeal from the Circuit Court of the United States for the district of Connecticut.

Mr. Justice Bradley delivered the opinion of the court.

This is a suit on a patent granted to Charles B. Bristol, May 16, 1865, for an improvement in harness hooks or snaps, the complainants being assignees of the patent. These hooks are usually attached to the end of a strap or chain for the purpose of fastening it to a ring or staple, as in the case of a tie strap, for fastening a horse to a post. The small hook by which a watch chain is fastened to the ring or stem of the watch is an example. It has a movable part, called the "tongue," which is connected to the shank of the hook by a pivot, and is kept in place against the end of the hook by the pressure of a spring acting between the shank and the tongue. The tongue may be pressed inward so as to admit the ring or staple, and is thrust back to its place by the action of the spring. In some form or other the implement has long been in use. The patent in question relates to the mode of arranging the spring in the tongue and of attaching both to the shank of the hook.

Held, where the patented invention is but one of a series of improvements, all having the same general object and purpose, the claims of the patent must be restricted to the precise form and arrangement of the parts as described in the specification and to the purpose indicated therein.

Where all the parts claimed, with one exception, were old and had been used in a similar combination in other things of the same general character, the defendant, not using the excepted part, escapes infringement.

On the whole view of the case, we are satisfied that the defendants do not infringe the patent sued on when construed as it must be to give it any validity. The decision of the circuit court must therefore be reversed, and the case remanded, with instructions to dismiss the bill.

U. S. Circuit Court.—Southern District of New York.

HIGGINS *et al. vs.* KEUFFEL *et al.*

LABEL COPYRIGHT.

This bill is brought upon a copyright of a label registered in the Patent Office by the orator Higgins, October 27, 1883, numbered 3,693, act of June 18, 1874. (Suppt. Rev. Stat., 40; 18 Stat., 78.)

The law prescribes that the word *copyright*, with the year and the name of the party, shall be inscribed; or the words *entered*, etc., with the name and the year. The plaintiff failed in this. No notice of a copyright by inscription on the labels is given, otherwise than by the words and figures, "Registered, 3,693, 1883," printed on their face.

The exact form of the notice is prescribed by law, and no equivalent is provided for, nor any room for an equivalent left. If that specific notice is not given, the right of action otherwise conferred is withheld. All the requirements of law on which the right of action rests must be complied with, or the suit cannot be maintained. (*Wheaton vs. Peters*, 8 Pet., 591.) This notice is so defective that the publication of the label with no other was the same in effect as a publication without any would have been. Such a publication is practically an abandonment of the copyright. Let there be a decree dismissing the bill of complaint, with costs.

To maintain an action for protection of a label by virtue of its registration in the Patent Office, under the act of June, 1874, notice of such registration must have been given in the form prescribed by the copyright law.

Publication of the label with a defective notice is the same as a publication without notice, and is practically an abandonment of the copyright.

If the orators have any rights to the contents of the label growing out of its use as a trade mark, these rights are not involved in a suit for infringement of copyright of the registered label.

Peculiarities of Customers.

"Customers have queer peculiarities," said an old retailer to an interviewer on the St. Louis *Grocer*, "and it takes a long apprenticeship to wait on all of them satisfactorily. Now, I know all the failings of my old customers, and I can get along with them without any trouble. But let a new clerk tackle one of these, and not knowing the peculiar individuals he has to deal with, he will soon find himself in hot water. So, when I get a new clerk, which rarely happens, for I do not believe in making changes, I go over my list of customers and post him as well as I can how each will have to be treated to get along without friction.

"Speaking of the peculiarities of people, they are almost beyond belief. Now, I have one old customer, a farmer, who would not buy anything of me if I promptly met him at the door and asked him what I could sell him. If I did, he would leave the store at once. I just let him alone, and he will hang around the store a long time, watching me wait on customers and looking at one article after another, not forgetting to nibble at the crackers and cheese. When he has done this to his heart's content he is ready to buy, and I generally succeed in selling him a nice bill of goods.

"Another customer is just the opposite of this one, and the moment he steps into the store he must be recognized and treated in such a manner as to make him believe his trade is more desirable than that of any one else. Then there is another customer who must taste everything he buys. Butter, cheese, sugar, salt, tobacco, sirup, pepper, cinnamon, vinegar, and I almost said coal oil. The latter he would want to smell any way. That man could no more buy a bill of goods without sampling each article than he could go to sleep without shutting his eyes.

"But it is among the women that I find the most peculiar customers, probably because they do more of the buying than the men. Their peculiarities are legion, and life is too short to tell of them. There is the one who is afraid she will be cheated in every purchase she makes, and will insist on some private mark by which she can tell that she gets the particular articles prepared for her. Then there is the one who wants a 'sampling' of this, that, and the other thing to take home and try, in order to see if they will suit the 'old man.' She is almost as bad as the one who wants everything a little under price because she does all her trading with you and does not trade with your competitor across the way, and she does think of giving him a part of her trade. Finally, there is the young husband and wife who have just gone to housekeeping, but their peculiarities are too sacred to be mentioned, and I will spare them. I was there myself once."

Natural Gas in Wayne County, New York.

Natural gas was discovered at North Rose, N. Y., on May 18. For several weeks workmen have been employed there boring an artesian well. They did not have the least idea of finding natural gas. When the workmen were preparing to quit the well at night, the land about the mouth of the well was thought to be giving way. To see down into the well, a lighted candle was lowered a few feet into the well. An explosion followed, and a great flame of fire burst out of the mouth of the well. Several men who were standing near watching the operation were thrown violently to the ground. Their hair and whiskers were singed. The flame shot into the air over ten feet and in less than half an hour increased to seventeen feet, with a diameter of four inches at the bottom.

When darkness came, the flame could be seen for miles away, and hundreds of farmers thought the village of North Rose was burning, and drove long distances to help the villagers. The flame has continued steadily, and seems to increase in volume each hour. The citizens propose forming companies for boring wells for natural gas. Wells will be begun at once in Wolcott and Clyde and Lyons.

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NEW YORK WATER SUPPLY.

(*Continued from first page.*)

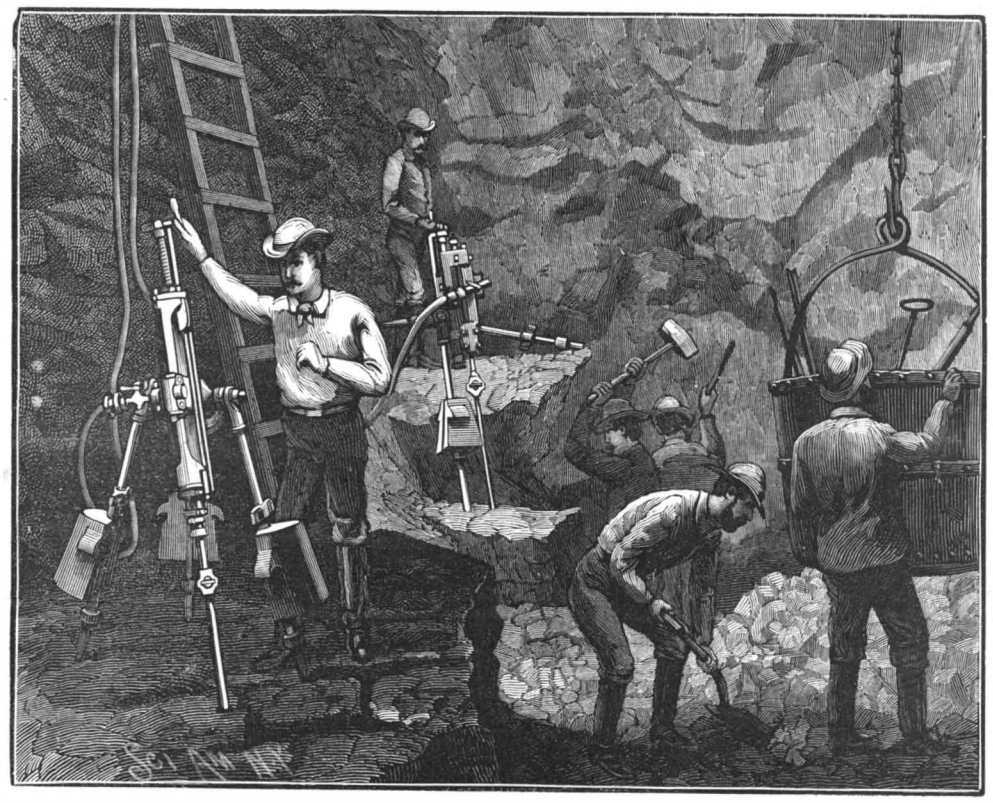
The aqueduct is the shape of a horseshoe in section, and has a sectional area of 155½ square feet. When filled to within 7-10 of a foot from its top, it will deliver 318,000,000 gallons per day, or three and a third times the present daily consumption of 95,000,000 gallons.

The grade of the aqueduct from Croton Lake to shaft 20 is 7-10 of a foot to the mile. At Gould's Swamp, near Tarrytown, the aqueduct encountered soft material, upon which no reliance could be placed, and through which it would have been a difficult matter to build the tunnel. It was therefore decided to drop a short section 70 feet, in order to secure a firm bed in solid rock. At shaft 20, the aqueduct descends 115 feet on a grade of 10 per cent. From the bottom of this incline to the bank of the Harlem, the usual grade of 7-10 of a foot to the mile is maintained.

We now reach the most interesting point on the aqueduct proper—where it dips and passes under the Harlem River. The bed of the river is composed of sand and gravel at the eastern side, and mud at the western side; below these is hard rock, which assumes the form, immediately under the mud, of a deep and narrow valley or gorge. It was at first thought that the aqueduct, in order to clear this low spot and make the crossing in solid rock, would only have to be sunk 150 feet below the river water level. To reach shaft 24, on the eastern bank of the river, the aqueduct descends on a grade of 15 in the 100; according to the first plan, that portion under the river to vertical shaft 25, on the opposite bank, was to be 2 in the 100. From the bottom of shaft 25 it was proposed to extend a test drift toward the gorge, and in that way ascertain its depth and the character of the material directly beneath it. This was done, and drill holes were made in the heading of the test drift. These showed that the gorge extended below that level, and that it was not possible to carry out the original intentions. Shaft 25 was then extended about 100 feet deeper. Should solid material be found at this depth, the aqueduct will be built under the river, and the steep section from the other shore extended to meet it.

From the Harlem, the aqueduct passes under Tenth Avenue to the distributing gate house at 135th Street.

The manner of prosecuting the work is illustrated by the engravings upon this page, which show the plant at the top of the shaft and the method of sinking the shaft and driving the heading. Our views were selected partly to show the Ingersoll air compressors and rock drills, as these machines are extensively used along the entire line, and have invariably given the greatest satisfaction. The shaft or well leading from the ground surface to the grade line of the tunnel is sunk in the usual mining way. By means of the well known "Eclipse" drills, holes are sunk to a depth of three or four feet in the bottom, being so distributed as to cover the whole section. The holes are then filled with explosives, tamped, and discharged by electricity. As the shaft progresses, the hoisting machinery is brought into operation, and the men and material are raised and lowered by the cage. When the bottom has been reached, the two tunnels are started in opposite directions, to meet the two others coming toward them from the adjoining shafts, and each heading is then independent of the other, and is worked by its own gangs. When one heading has been drilled and the holes charged, the men retire to a safe distance and the charge is fired. Fans at the surface are then set in operation, to remove as quickly as possible the gases resulting from the explosion, as they affect the health of the men.



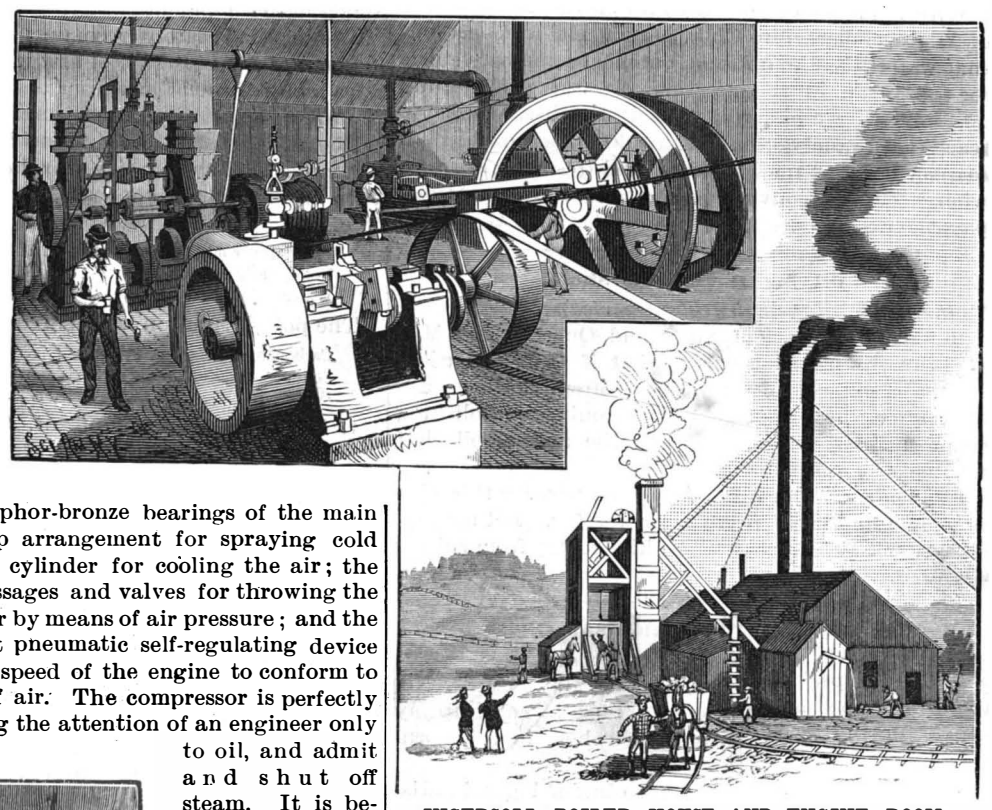
THE INGERSOLL DRILLS AT WORK IN THE AQUEDUCT.

The Ingersoll air compressors and rock drills are well known and appreciated wherever mining operations are prosecuted. Their "Straight Line" compressors are built on the most approved plan. The most essential features in the construction of this machine are in the improved cylindrical inlet and outlet air valves; in the simple and quick manner of adjusting the phosphor-bronze bearings of the main shaft; in the pump arrangement for spraying cold water into the air cylinder for cooling the air; the arrangement of passages and valves for throwing the engine off the center by means of air pressure; and the simple and efficient pneumatic self-regulating device for controlling the speed of the engine to conform to the consumption of air. The compressor is perfectly automatic, requiring the attention of an engineer only to oil, and admit and shut off steam. It is because of these points, which we have only mentioned, that the Ingersoll compressors are so well received.

The "Eclipse" drill can be operated by either steam or compressed air. It has an independent steam-thrown valve, shifted by the steam or air used, and there is, in consequence, no rocker arm or tappet liable to break and damage the cylinder. In drills of the same size all the parts are interchangeable. The stroke can be varied from one to seven inches; and as both cylinder heads are protected on the inside by elastic cushions, which receive the blow of the piston when the bit suddenly cuts into an open seam or hole, the piston may be safely allowed to run at its full stroke. The drill is mounted upon an adjustable tripod constructed to permit drilling at any desired angle.

Regarding the efficiency of the Ingersoll drills, and the ease and rapidity with which they may be handled, we may state that the best weekly and monthly records of completed work on the new aqueduct, 83 feet (full section of tunnel) and 265½ feet (full section of tunnel), respectively, have been made with these drills, the material passed through being hard granitic gneiss. They are used on the Croton dam section of the aqueduct exclusively, and also from shafts 0 to 11, from shafts 22 to 24, the section under the Harlem River, and at the gate house at 135th Street. They are also used at shafts 12 A, 12 B, 14, 18, 18½, 19, 20, and 21.

The entire aqueduct from the gate house at Croton dam to the one at 135th St. is now under way, the total contract price, including the two gate houses, being $14,000,000. The estimated cost of Quaker Bridge dam is $6,000,000, making the aggregate cost of the improvement $20,000,000. The old aqueduct cost $12,500,000.



INGERSOLL BOILER HOUSE AND ENGINE ROOM.

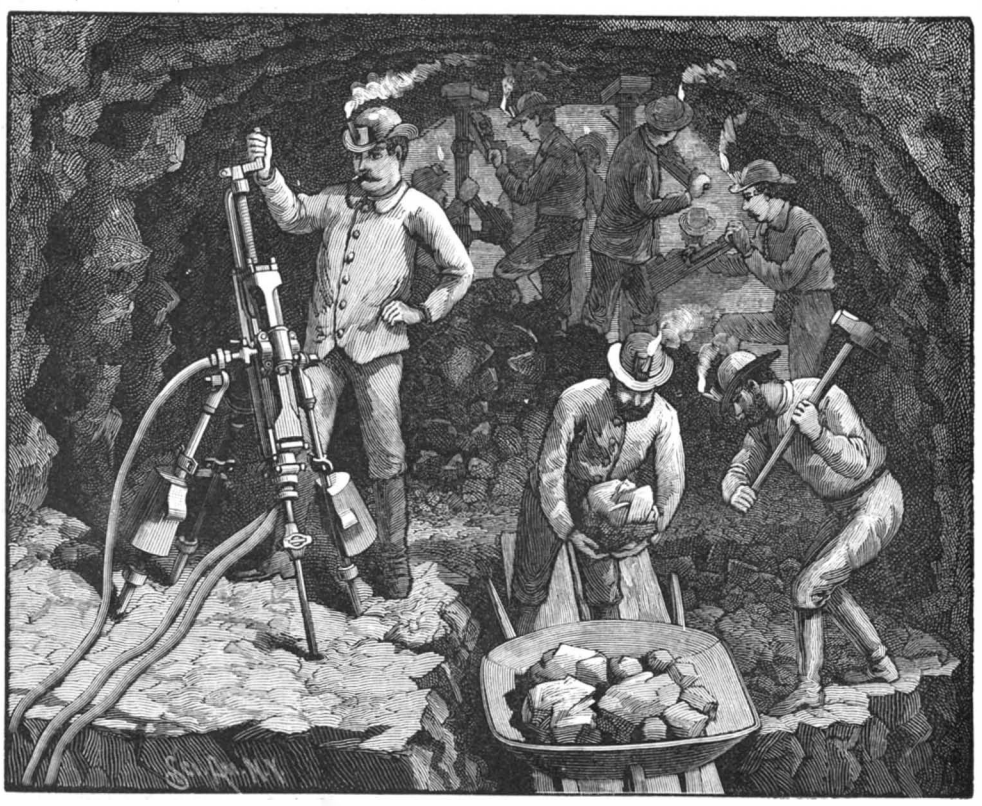
The Hammond Type Writer.

This is one of the very best machines in the market. It is just now having a successful introduction in England, and attracts much attention in the American Exhibition, London.

Among other advantages claimed for the Hammond machine are that it is compact in form and portable, weighing only 15 pounds; that the action is simple, and the machine easily worked by reason of the accessibility of the keyboard and the disposition of the keys, and that the paper is not horizontal, but vertical, and is therefore easily read by the operator as he works. The alignment is very perfect and the impressions are uniform. The type quadrants can be removed and replaced by others bearing a different type if desired. The paper being slipped into a hollow cylinder, a very long rule may be used, and as the carriage ends are opened, the paper may be of any width.

A Remarkable Steamer.

The new British steamer Ormuz lately made the voyage from Adelaide, Australia, to Liverpool, a distance of 11,000 miles, in 27 days, being an average of 17 miles an hour. Coal consumption, only 110 tons per diem. The ship is 465 feet long, 52 feet beam, 37 feet depth, 10,500 tons displacement loaded, 8,500 horse power, boiler pressure 150 pounds, seven boilers. Time occupied in building, nine months.



INGERSOLL DRILLS AT A HEADING.

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THE PITCHER PLANT.

This plant belongs to the small family *Sarraceniaceæ*, which includes only the species *sarracenia*, *heliamphora*, and *darlingtonia*, and its peculiarities are that the leaf stalks, as shown by the cut, are pipe-like, and the leaf proper on the end of the pipe appears as an ear-like appendage. The pipe or tubes extend first along the ground, and then bend upward. The interior of each tube is covered with a network of veins, and the interior glands secrete quantities of water which attracts all kinds of insects, most of which perish. For this reason, these plants have been called, since the time of Darwin, insect-devouring plants. Although their structure is very wonderful, they are not unique, for many other plants have tube-shaped petioles; take, for example, the *Nepenthes*, *Cephalotus*, *Darlingtonia*, etc. Linne knew the species, and gave it the name of Dr. Sarrazin, of Quebec.

THE PITCHER PLANT.

These plants are found only in North America, specially in the southern part, where they are known as "pitcher plants" or "fly traps." There are about six species, viz., sarracenia purpurea L., S. rubra Walt., S. flava L., S. psittacina Mx., S. variolaris Mx., S. drummondi Hook., S. leucophylla Rafin. The flower is very insignificant, the distinguishing feature of the plant being the trumpet-shaped leaves. This genus grows in marshy land. This is, in brief, a description of a plant which interests us specially, since it has been found on the high lands of the Thuringen forest, where it will have to endure severe winters. We hope that its discoverer did not disturb the roots, so that they may increase in the natural way, as the plants blossom and go to seed.—*Illustrirte Zeitung.*

THE PINE SNAKE—SO-CALLED HORN SNAKE.

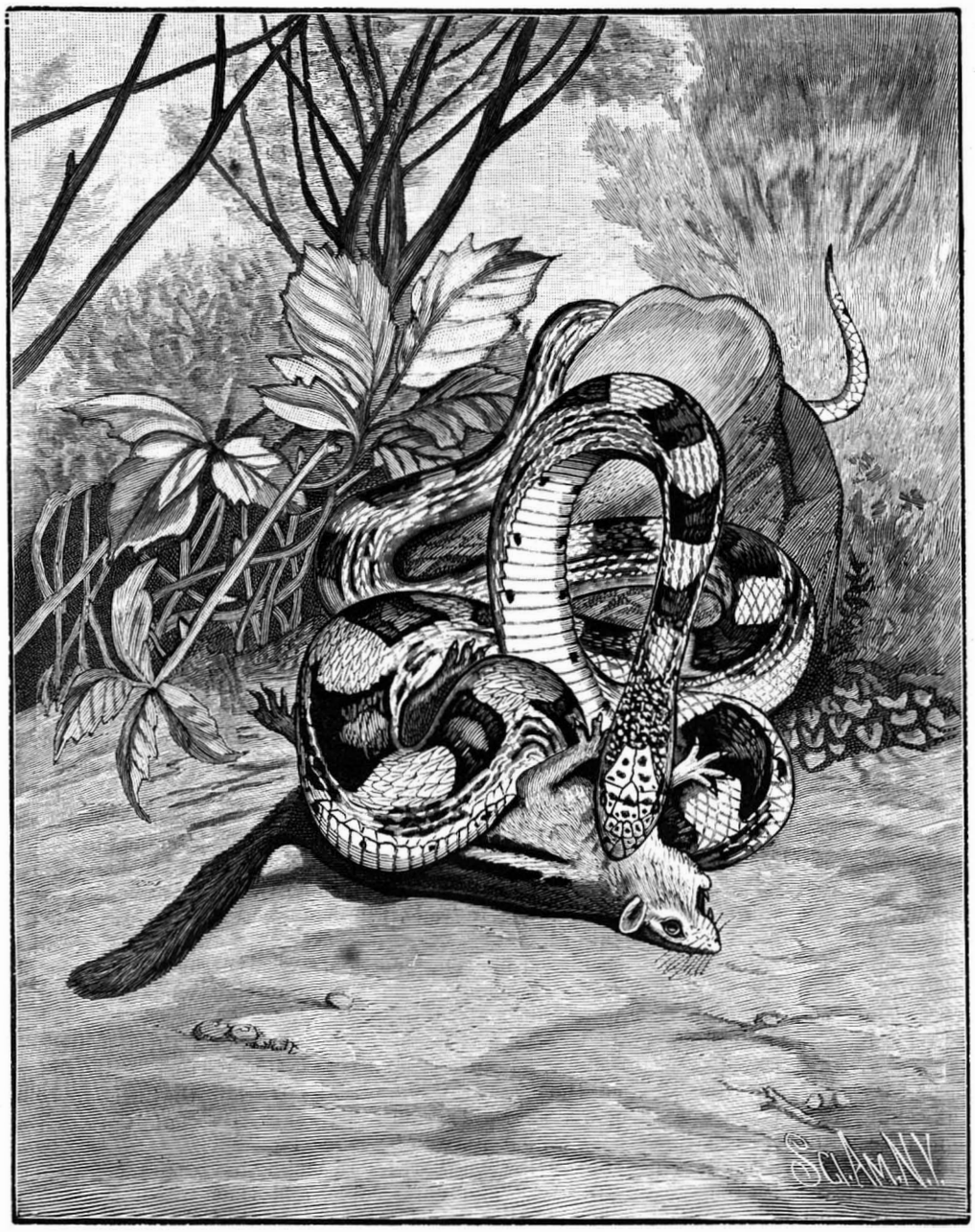
BY C. FEW SEISS.

Gonston, in a curious book entitled *Hist. Nat. Serpentibus*, published in England in 1653, says: "In America are found asps with stings in the tail, wherewith they strike and kill." To the present day there are people in America who firmly believe in the existence of a deadly horn or hoop snake. Only last summer, a Philadelphia daily paper, noted for its veracity, published a clipping from a Virginia paper, stating that in a certain locality in said State the horn snakes were so numerous as to be destructive to young oak trees. The account says the snakes (in mere play I suppose) rolled hoop-like down the hill and struck their poison-horned tails into the trunks of the trees, and "a witness" observed that the leaves upon the trees thus stung would wither and turn brown in two hours, and the trees themselves were completely destroyed!

It is to be deplored that "witness" neglected to secure and preserve specimens of such rare ophidians—serpents injurious to vegetation! He would certainly have made himself both famous and wealthy.

Wasps, bees, and scorpions have a sting or lancet-like instrument at the end of the abdomen or tail, generally furnished with a poison duct; but serpents have venom weapons in the form of teeth only, never in any other situation. The so-called venomous horn and hoop snake never existed in America or in any other country. They are impossibilities and myths.

The venom of serpents is not injurious to vegetation. That delicate seeds will throw out roots and sprout in dilute snake poison has been repeatedly demonstrated. A hole bored in the trunk of a tree and filled with serpent venom would cause no perceptible ill effect to the tree. Not long ago I met a reverend gentleman who sincerely believed in the existence of a poisonous horn snake—not a *cerastes*, which has two horn-like projections upon the head, but one with a "poison sting" at the tip of its tail. He said he himself at one time saw a "horn snake" killed and cut apart with a scythe, and that he plainly observed the scythe was covered and spattered with the unmistakable "white poison" from the snake. Now, snake poison is a fluid generally of a pale yellowish tint, and several drops (two to four) is the amount contained in each venom gland. The "white poison" which my friend saw upon the scythe was simply a portion of the food of the snake after having passed through the process of digestion. It is found in the excrements of all serpents. Many birds, especially birds of prey, give off large quantities of much the same "white poison."



THE PINE SNAKE—SO-CALLED HORN SNAKE.

Knowing that the gentleman was truly sincere in declaring he had seen (what he supposed to be) a horn snake, I was desirous of knowing to what species it really belonged; and not having specimens handy, I placed before him colored drawings of the serpents likely to exist in the locality designated. In a short time he picked out the figure of the pine snake, *Pityophis melanoleucus*, and exclaimed, "That's it!"—the very same serpent that was pointed out as the "horn snake" to Dr. Holbrook forty years ago.

Its tail does certainly end in a horny point, as is the case with several of our snakes, but it is needless to say there is no venomous gland or duct connected with it in any way whatever, but that it is as harmless as the bill of a baby chick just out of the egg. Indeed, the pine snake is in no way harmful. It is without venom fangs, and is not a constrictor, like the boas.

Some time ago, I saw in a saloon window a card bearing this notice: "Turtle-headed Snakes on Exhibition." I went in with a friend to see what these unheard of serpents might be, and after waiting a short time, the bartender drew from a box a snake about four feet in length, which he fondled and entwined about his neck, and twice put its head into his wide open mouth. This latter performance the snake evidently did not enjoy. There were three serpents on exhibition, all of them being common pine snakes. When I informed my friend to what species they belonged, one of the audience heard my remarks, and I was flatly contradicted in a menacing manner.

A young Southern lady informed me—and I know she truly believed what she said—that in Eastern Virginia she once saw a dark colored snake drop from a tree, throw itself into the form of a hoop, and roll away with lightning-like rapidity; but, poor darling! she was nearly frightened to death, and what she seemed to see was but an imaginary picture flashed upon a terror-struck brain. I have heard, from "actual witnesses," many wonderful stories concerning the deadly "hoop-horn snake," but they are all lies or the production of morbid imagination.

The pine snake feeds upon frogs, toads, and the smaller mammals. It is found occasionally in Pennsylvania, frequently in New Jersey, southward to Florida.

Calcined Oyster Shells as a Remedy for Cancer.

In a recent number of the *Lancet*, Dr. Peter Hood, of London, refers to a communication of his published in the same journal nearly twenty years ago, on the value of calcium carbonate in the form of calcined oyster shells as a means of arresting the growth of cancerous tumors. In a case which he then reported, that of a lady nearly eighty years old, the growth sloughed away and left a healthy surface after a course of the remedy, as much as would lie on a shilling being taken once or twice a day in a little warm water or tea. He now reports another case of scirrhus of the breast, in the wife of a physician, in which the treatment was followed by an arrest of the growth and a cessation of the pain, the improvement having now lasted for years, and no recrudescence having thus far occurred. He urges that the remedy can do no harm, and that the *prima facie* evidence in its favor is stronger than that on which, at Dr. Clay's recommendation, the profession lately displayed an extraordinary eagerness to try Chian turpentine. He would restrict the trials to well marked cases of scirrhus, and insists that no benefit should be looked for in less than three months.

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Why Workmen Are Not Fully Employed.

Some very important facts belonging to the labor question have been developed by the Illinois Bureau of Labor Statistics. This body in its latest report shows that of the workingmen in that State only 20 per cent are employed full time, and 35 per cent work less than half time. Those who get less than 40 weeks' work are 65 per cent of the whole; and those who get only from 13 to 30 weeks' wages in the year 35 per cent of the whole, or 30,451 in number. The conclusion drawn from these rather mournful figures, by the report, is that they supply a strong argument for the reduction of the hours of daily labor; the idea being that, as there is only just so much work to be done, the diminution of the time spent in doing it will have the effect to permit the larger employment of men now not fully employed. This notion, it will be observed, is simply a development of the theory that there is overproduction of the fruits of labor; that men now make more than men can consume, and that, as too much wealth is produced, idle or half idle persons cannot find full use for their powers except by decreasing the time in which all others are employed.

Now, we venture the assertion that these conclusions, and the theory from which they are drawn, are wholly apart from the truth, and absolutely defiant of the first principles of economy. It may be laid down as a fundamental fact, beyond the reach of controversy, that there has never been, and that there never will be, any such thing as overproduction of the general mass of things upon which human industry expends itself. The reason for this is that there cannot possibly be a creation of too much wealth until human desire is completely satisfied, and human desire for good things is an appetite which grows constantly with the materials upon which it feeds. That all men do not now have enough is a fact which needs no demonstration. The complaint of these Illinois workmen is that they do not or cannot get enough—not that they or any of their kindred and acquaintance have too much. If they and millions of others cannot fully supply their wants at a time when multitudes of men are complaining that, for their part, they cannot find opportunity to go to work to create such supply, then, manifestly, the trouble is not that too many are working and producing too much, but that there is some grave and scandalous defect in the social and commercial machinery which operates under the pressure of supply and demand. This is as clear as sunlight to every man who thinks.

What, then, is the matter? We think we can give at least a partial answer to that question. We must, of course, put aside the cases of men whose business is of such a kind that it cannot be pursued constantly, as, for example, bricklayers and masons, against whom is the fact that their work can hardly be done in wintry weather. The matter must be considered in a general way, on broad grounds; and we declare that the first thing to be considered as the greatest and worst and most destructive enemy of the workman is the rum traffic. Let us leave out of the question the moral aspects of that business, and regard it wholly from an economical standpoint.

In the report issued last month by the Bureau of Statistics at Washington, it is shown that the total annual expenditure for malt and spirituous liquors at retail in the United States is $700,000,000, and that the drinking population includes about 15,000,000 persons. According to the census of 1880 (the most recent and accurate source of information we have), the total annual product of four great industries in this country is as follows:

Clothing, men's and women's	$241,553,254
Cotton goods	210,950,383
Woolen goods	160,606,721
Iron and steel	296,557,685

Comparing these figures with those given above by the Bureau of Statistics, we find that the money squandered for rum by our people was more than three times greater than that expended for ready made clothing; that it was in excess of the value of the total combined product of the cotton, woolen, and iron and steel industries, and not much less than the value of the product of all four of the industries named. Of the fifteen million persons who wasted this vast sum, each man expended nearly one dollar a week in gratifying a base appetite. Every dollar of all this money was just as much wasted as if it had been dumped in the ocean. Indeed, such disposition of it would have been wise economy compared with that which was really made of it; for only the first cost of the rum appears in the sum of $700,000,000. Probably the amount would be increased more than 50 per cent if we should ascertain the cost of the crime, pauperism, and insanity which always follow as the products of the rum traffic. Now, suppose all this money, three times the value of the total iron product of the country, had been expended for things useful, comfortable, and necessary, does any man believe that there would be complaint of overproduction? Would any laborer who wanted to work be forced into idleness? Is it not clear that there would be such a stimulus for business as would give to this country prosperity greater than any it has ever known, with good wages for honest work? Here is one of the defects in our industrial machinery that need repairing. And observe out of the fifteen million drinkers and squanderers the vast majority are themselves workingmen. It is their money that goes into this terrible sink hole. It is their own hands that strike such a deadly blow at their dearest interests.

These are facts. We commend them to the thoughtful consideration of intelligent men. What ought such men to do with a traffic so costly, so destructive, so ruinous, a traffic which is purely vicious, of which not one good word can be said? Ought it not to be suppressed and strangled? Is it not blind folly to palter with such a monstrous public enemy?—*Textile Record.*

Bread Making.

The *Milling World* gives the following facts of interest to all housewives:

A barrel of good flour should make from 270 to 285 five cent loaves. Many bakers blend four brands, as two Minnesota springs and two Indiana winters, before they get the right alloy. Others use only one grade of spring and two of winter wheat. These make the best brands of fancy bread. Formerly yeast was made of malt, potatoes, and hops, and this is extensively used. Fancy bread bakers use a patent yellow compressed yeast. It is popularly supposed that bakers use alum extensively in order to whiten their bread. That is not the fact. There is no necessity for the use of alum, and it is not used in the trade. There are about twenty large steam bakeries in New York, which give employment to several hundred men. One of these, a noted Broadway establishment, makes a specialty of Vienna bread, and does an immense business. Vienna bread is made in air tight ovens, of the best grade of flour, and milk is used instead of water in mixing the dough. In baking, the steam settles back on the bread instead of escaping. This makes the outer crust thin and tender, and gives the bread a peculiarly rich taste and pleasant aroma. What is known to the trade as "steam" bread is another recent invention. It is made of the very finest of flour and baked in air tight pans, which inclose it on all sides. It is thus baked in its own steam, and possesses a flavor peculiarly its own. One very large bakery in New York is devoted solely to the production of aerated bread. It is a steam factory, and the bread so made is extremely light and spongy. The invention is an English one, but has been in use here for years. When the dough has reached a certain consistency, it is run into an air tight cylinder and stronly impregnated with carbonic acid gas. This creates the lightness and sponginess without detracting in the slightest from its nutritious qualities.

Taxes on Commercial Travelers.

There seems still to be considerable indistinctness in the minds of many merchants and commercial travelers regarding the effect of the recent decisions of the Supreme Court of the United States in the commercial travelers' tax cases. Under the circumstances, a brief recapitulation of the decisions of the Supreme Court upon the subject, together with some reference to the means by which the rights of traveling agents under them may be secured, may not be without its use.

The Supreme Court took the broad ground in the Robbins case, decided in March, that legislation by States or municipalities imposing taxes on commercial travelers engaged in inter-state commerce was not warranted by the Constitution, that salesmen from one State entering another to solicit orders or negotiate sales by samples or otherwise are engaged in inter-state commerce, and that taxes upon them by way of licenses upon sales constitute an interference with inter-state commerce such as falls within the jurisdiction of Congress alone. The court expressly declared that the fact that the State legislation does not discriminate between domestic and foreign drummers has no bearing whatever upon the question of its constitutionality, but that inter-state commerce cannot be taxed at all, even though the same amount of tax should be laid on domestic commerce, or that which is carried on solely within the State. The legislation declared invalid in the Robbins case was that of Tennessee.

In another case, that of Gorson *vs.* Maryland, the court declared void the Maryland law requiring any one not the grower, maker, or manufacturer selling goods within the State to pay a license tax proportioned to the amount of his stock in trade, whether situated in the State or out of it.

The Supreme Court has, beyond question, settled the principle that State laws imposing taxes on foreign travelers are unconstitutional. Its decision, however, does not operate to repeal these laws as a whole, or even to repeal those which have been declared unconstitutional. As to the latter, the effect of its decision is to make them unenforceable upon individuals. As regards the others, which have not yet been passed upon, it is open to the State authorities to claim that these laws are still valid and enforceable, and that there is some element in them which takes them out of the scope of the decisions already had. The only way in which the validity of these laws can be determined is upon actual cases. The exercise of the jurisdiction of the Supreme Court, or of the other courts of the United States, is confined to cases and controversies. They can only exert their function of interpreting the Constitution in determining cases or controversies brought before them. The construction of the Constitution by them is incidental to adjudication upon the rights of the parties in such cases, and the relief which they grant is individual relief. The State officers must of necessity interpret and apply the State laws in the first instance, and if in their action under those laws they violate the constitutional rights of individuals by wrongful imprisonment or other punishment, the courts of the United States will, upon application, restrain the officials and relieve the oppressed individuals.

Commercial travelers, then, must look to the courts to secure their rights under the late decisions of the Supreme Court. They should apply preferably, of course, to the United States circuit or district judges, particularly in States whose legislation has not been passed upon specifically by the United States Supreme Court. They will, by so doing, be surer of getting relief. If, however, they are molested for not paying taxes in localities remote from the place of sitting of a United States court, they might make application to a State court. The Constitution declares that judges in every State shall be bound by the Constitution and the laws made in pursuance thereof, anything in the constitution or laws of any State to the contrary notwithstanding, and with equal reason should the authorized interpretations of the Constitution be held binding upon the State judges. As a matter of fact this obligation is generally recognized by the State courts. If, however, they fail to give relief, recourse may be had in any case to the United States courts. It is hardly necessary to say that the uncertainty regarding the validity of the tax laws of any particular State can be only temporary at the worst. It is inconceivable that the State authorities would continue for any length of time to attempt to enforce legislation the principle of which has been condemned by the court of last resort, and from the enforcement of which relief may be had upon application to the courts.—*Bradstreet's.*

The question is frequently asked whether patentees or their agents, who travel from place to place, making it their business to sell patented articles, are liable to local fines and penalties. It will be seen from the foregoing decisions of the Supreme Court of the United States that they are not liable.

American vs. Russian Petroleum.

United States crude petroleum oil is to Russian crude as cream to skim milk. United States crude yields about 75 per cent of the finest illuminating oil the world produces. Russian crude yields only about 29 per cent of an inferior illuminating oil. United States crude yields about 12 per cent naphtha or spirit of such a valuable character that it readily sells for 20 per cent per gallon more than the oil. Russian naphtha is unmarketable, and it is mostly burned to get rid of it. United States lubricating oils, another product of crude, are now so low in price that Russian lubricating oils are practically debarred from competition in many of the European markets. United States crude yields a considerable percentage of scale, used for candle making, and this is a product of great value; weight for weight it is worth four times more than refined petroleum oil. The Baku crude yields no scale. Thus the United States, in the surpassing richness of its crude, has an enormous and unapproachable advantage over Russia.

The daily production of the United States is in excess of the world's demand, and has been so practically for the last ten years. In addition to this excess in the daily production of the United States, there are stored there, above ground, 34,800,000 barrels of 42 gallons each, the actual unmarketed accumulations.—*Pall Mall Gazette.*

Wild Geese Killed by Lightning.

R. Burch, who resides on Rock Creek, north of town, informs us that during the storm of April 29, as he and his family were watching the clouds, a flock of wild geese passed near the house. As he was looking at them there came a vivid flash of lightning, which seemed to pass right through the flock of geese, and the next moment the flock seemed to be thrown into confusion, uttered the shrillest cries of alarm, and six of their number were seen falling to the ground. They had been killed by the lightning flash Mr. Burch had noticed. He went and picked up the dead geese, which he found to be plump and fat, without a mark to show where the lightning had struck them. He had a feast of roast goose the next day. This is the first instance on record, we believe, of geese being struck by lightning while flying, and it is generally supposed that they are safe from the destroying bolt of Jove.—*Chico (Cal.) Chronicle.*

A CO-OPERATIVE carpet manufacturing company, which was started in Philadelphia a few months ago by dissatisfied workmen, was sold out by the sheriff on the 29th of April.

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COLLISION BETWEEN THE CELTIC AND BRITANNIC.

At 5:25 P.M., May 19, about 350 miles east of Sandy Hook, two sister steamers of the White Star line, the Celtic and the Britannic, came into collision, four passengers being killed and fifteen wounded on the Britannic, and both vessels sustaining considerable damage. Our illustrations are accurate representations of the appearance of the vessels on their arrival at the dock after the accident.

The Britannic was going east, having sailed from New York for Liverpool on the afternoon of the day previous, while the Celtic was bound for New York, having left Queenstown May 13. The sea was smooth, but there was a heavy fog, as there had been for two or three days preceding. On this account the Celtic was considerably south of her regular course, and was proceeding but slowly, blowing her fog whistle. The Britannic was making about sixteen miles an hour, and also blowing her whistle at regular intervals. It is said the vessels were only about four lengths apart when they first saw each other, and although their respective fog whistles had just previously been heard by parties on both vessels, it does not seem to have been understood by those on either vessel in just which direction the sound came from. As the Celtic suddenly loomed up out of the fog on the port side of the Britannic, her commander had her engines reversed, and it is said she had almost ceased to make headway when the vessels came together. The commander of the Britannic simultaneously signaled to go ahead at full speed, in the hope of being able to cross the bow of the Celtic, but it was too late, and the sharp prow of the latter crashed into the Britannic about ten feet abaft of the engine room. The blow bent in the inch thick plates of the Britannic at this point, making a vertical corrugation, in the line of which there was a jagged hole, some 4½ feet by 18 inches, extending below the water line. The effect of this blow upon the Celtic herself was to make a clean cut through her stem, about eight feet from the top, the bottom part being twisted around till it pointed toward her stern, while the top part swept over the rails and cut away the stanchions and rigging aft to the stern on that side of the Britannic, killing and wounding those who could not get out of the way. About twenty feet back of the line of the first blow the plates of the Britannic were badly bent, as if from a second and less powerful blow, but there was no other break in the hull of the Britannic, although the rails were smashed, bolts twisted, and plates bent for a distance of about seventy-five feet.

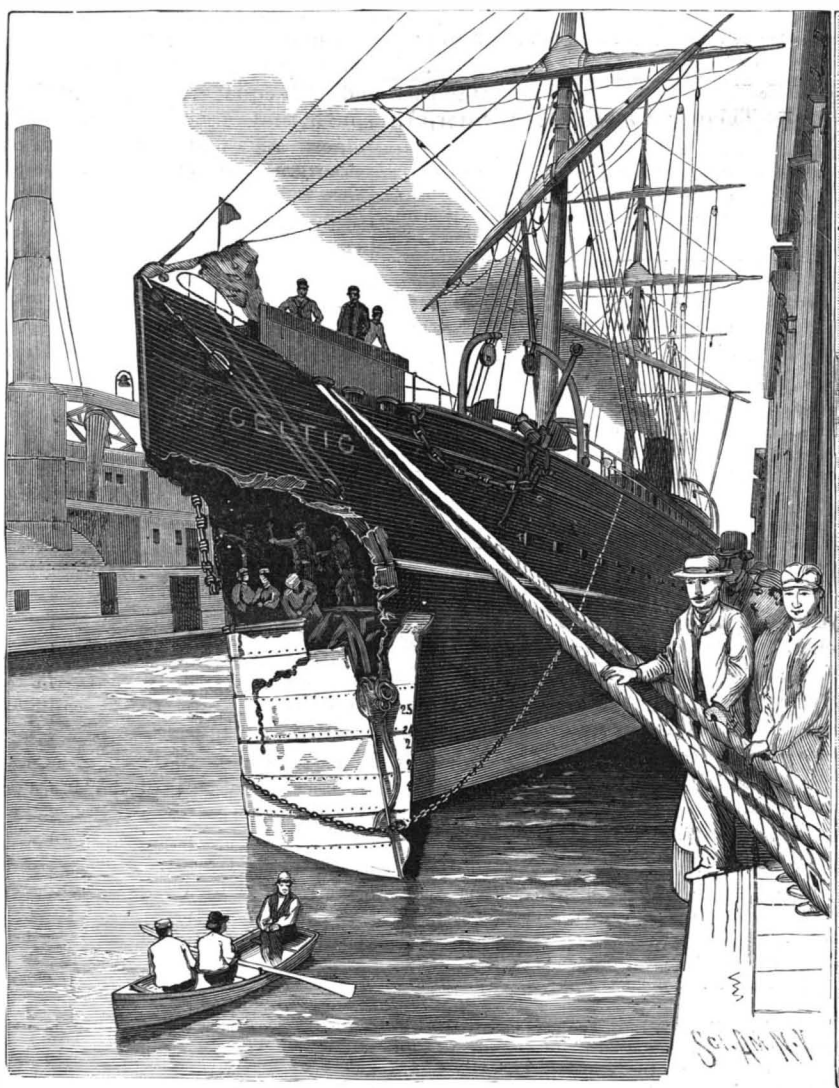
One compartment of the Britannic and the forward compartment of the Celtic at once filled with water, but the bulkheads separating these portions from the rest of the boat proved efficient in each case, and there was only a slight settling of the latter at the head, and of the Britannic at the stern. The machinery of both vessels was uninjured, and the damage can be repaired in a few days.

Both vessels were built at Belfast, Ireland, the Celtic in 1872 and the Britannic in 1874. The Celtic is 2,438 tons net register, and 3,888 gross; her length is 437·2, breadth 40·9, and depth 31 feet. She has four masts, a propeller worked by compound engines, with cylinders 41 and 78 inches in diameter, and 60 inches stroke of piston, and is divided into eight water-tight compartments.

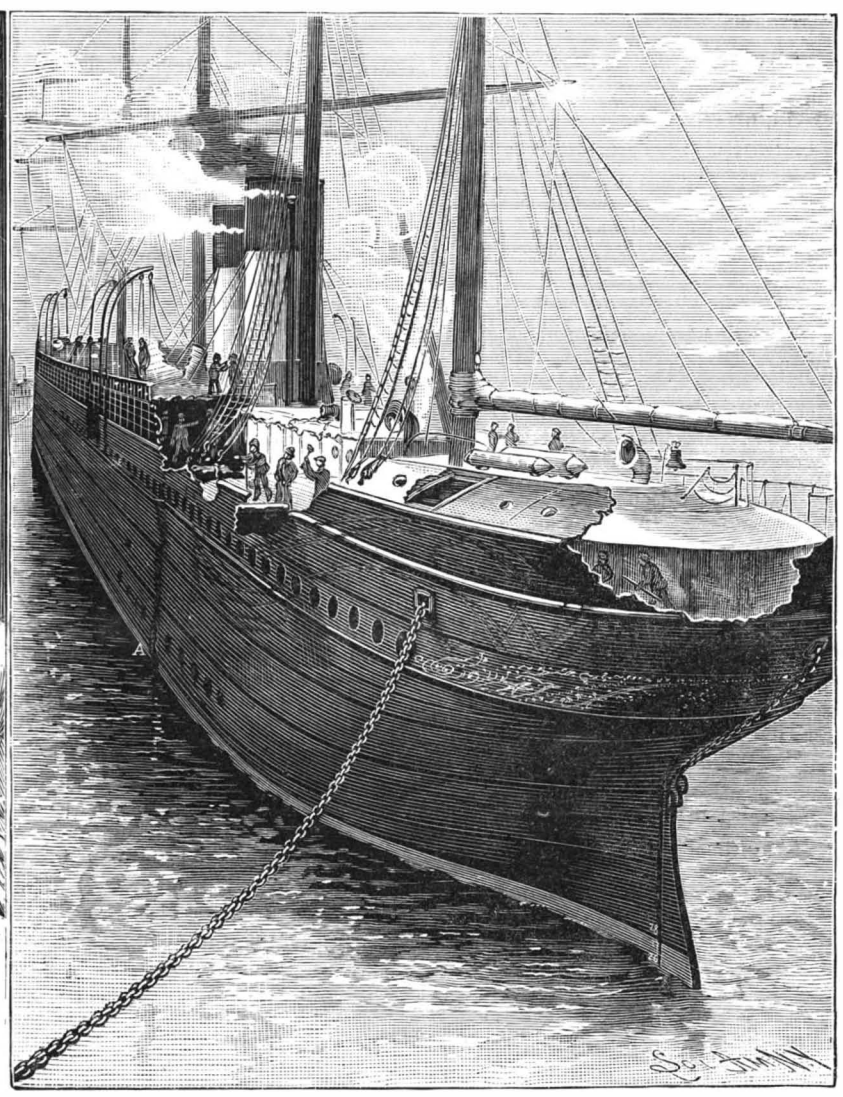
The Britannic is 3,174 tons net register, and 5,000 tons gross; she is 455 feet in length, 45·2 in breadth, with a depth of hold of 33·7. She has two engines, either one of which can be used separately, and the bulkheads forming the water-tight compartments have self-closing doors, the bulkheads running from the top to the bottom of the vessel.

Perhaps the one satisfactory part of the affair, if, in fact, there can be said to be anything satisfactory about so serious an accident, is the admirable work done by these compartments. Ocean travelers can certainly take courage in the thought that a vessel with a hole in the side large enough for a man to walk through may still be comparatively safe, and the White Star Company may well be satisfied that by the use of this simple system nearly two thousand lives have been saved and two magnificent vessels are still safe, and will soon be sound and ready again for further service.

That two such powerful vessels could thus collide in mid-ocean, with no deaths from drowning, and the vessels themselves suffer no more serious injury, will perhaps be measurably reassuring to the thousands who will cross the Atlantic this year; but the very way in which this accident occurred emphasizes the great importance of a more perfect system for signaling, which shall be effective during the fogs so prevalent on the North Atlantic.



STEM OF CELTIC AFTER COLLISION.



WHERE THE BRITANNIC WAS STRUCK.

COLLISION BETWEEN THE OCEAN STEAMSHIPS CELTIC AND BRITANNIC.

Chinese Anæsthetic.

A curious account of a Chinese anæsthetic is given in *Nouv. Remedes* (April, p. 165). It appears that Dr. W. Lambuth mentions in his third annual report of the Soochow Hospital an experiment made, at the suggestion of a Chinese doctor, with this preparation. A substance resembling wax, but harder and semi-transparent, in the form of a tablet, was cut into small pieces and digested in water for 24 hours, together with a small white, woody excrescence. The liquid was then found by Dr. Lambuth to possess well marked anæsthetic properties. It was found that a numbness of the lips and tongue was produced, and that the finger immersed in the solution for some minutes could then be pricked with a needle without any pain being felt. The tablet was described as being the juice of the eyes of a frog. It was probably the substance obtained by the Chinese by placing a frog in a jar containing flour and irritating the animal, when it exudes a liquid which forms a paste with the flour. This is then dried and made into cakes bearing some resemblance to button lac. If the anæsthetic property be due to the frog's excretion, and not to the white, woody excrescence above mentioned, the fact suggests the possibility of the animal using the secretion to deaden the pain to which it might be subjected by its enemies.

A Cheap Electric Pen.

A description has been given by Dr. J. Garel of a simple way to make an electric pen, to be used for multiple copying of letters or drawings, to the same effect as the somewhat costly Edison pen.

A tracing of the drawing to be copied is taken on thin paper, which is then laid upon a piece of common gas carbon. The larger the carbon in proportion to the paper, the less shifting will be required; but a piece of reasonably convenient size may be easily found, and it should be ground to a fair surface. The plate of carbon thus prepared is to be connected with one of the screws of a small induction coil, such as that used for an electric bell. The style for following the design, says a contemporary, is nothing more than a lead pencil, rather hard and brought to a fine point. The other end of the lead of the pencil is connected by a wire with the other screw of the induction coil, which in turn is connected with a suitable battery. The wood of the pencil effectually insulates the current from the operator's hand. The arrangement being thus completed, all that is necessary is to follow the design, or to write the letter upon paper resting on the block of carbon, leaning lightly upon the pencil. As the graphite point proceeds, a continuous succession of small sparks flows between it and the carbon, and the intervening paper is accordingly perforated by an infinite number of small holes burned by the sparks. These holes are barely visible to the naked eye, except by holding up the paper to the light; but they can be utilized for transferring the design or writing to paper, either by dusting on a powder or by passing an inked pad over the perforations when laid on the recipient.—*Electrician.*

The Fastest Boat in the World.

Messrs. Thornycroft & Co., of Chiswick, in making preliminary trials of a torpedo boat built by them for the Spanish Navy, have obtained a speed which is worthy of special record. The boat is twin-screw, and the principal dimensions are: Length 147 ft. 6 in., beam 14 ft. 6 in., by 4 ft. 9 in. draught. On a trial at Lower Hope, on April 27, the remarkable mean speed of 26·11 knots was attained, being equal to a speed of 30·06 miles an hour, which is the highest speed yet attained by any vessel afloat.

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ENGINEERING INVENTIONS.

A watering apparatus for cattle cars has been patented by Mr. Ferdinand E. Canda, of New York City. A principal feature of this invention is the utilization as ducts for the conveyance of water of the grab irons or hand rails on the roof of the car, whereby such irons are made to perform a double function, they forming tubular connections with the water tank or reservoir.

A car mover has been patented by Mr. Elouild Duplessis, of Lake Weedon, Quebec, Canada. A hand lever, having teeth, is pivoted to another lever formed with a hook at one end in such a way that, when the operator desires to move a car, he presses the lever up to the car axle, which is thus introduced into a pocket, and the operator can exert great pressure to turn the car axle.

A signal flag staff has been patented by Messrs. Rees W. Price and Henry A. Russell, of Oskaloosa, Iowa. It is for the especial use of railroad men, and combines three separate flagstaffs and flags in one, in a simple construction of such kind that the switchman or other operator will be able to draw out the flag he wishes from the hollow staff, the motion being governed by springs and pawls.

A packer for oil and gas wells has been patented by Mr. John D. Brooder, of Kane, Pa. A tube section is made with an elastic rubber cylinder inclosing a part of the section and carrying a device for engaging the wall of the well and preventing the tube from turning, while a nut is arranged to be turned on the tube section by the well tubing for compressing the rubber packing cylinder and causing it to expand laterally against the walls of the well.

A steam engine has been patented by Messrs. Finlay W. Ross and Carl P. Henrikson, of Prentis' Bay, Mich. Piston rods extend from both ends of a steam cylinder, segmental arms being connected by chains or rods with the piston rods, connection being thence made with the main shaft, on which is a crank disk, whereby the oscillating motion is converted into a rotary motion, with other novel features, the construction being simple and durable.

AGRICULTURAL INVENTION.

A farm gate has been patented by Mr. Arthur C. Baumwart, of Ossian, Iowa. The gate has a flanged roller between rails and supported by posts, with levers to which the roller is journaled, in combination with bars, arms, weights, cords, pulleys, levers, and standards, so designed that the gate shall be as readily opened and closed by a person on horseback or in a wagon as when upon foot.

MISCELLANEOUS INVENTIONS.

A paper trimming and pasting machine has been patented by Mr. John D. Hooper, of New York City. This invention covers a novel construction of machine especially designed for cutting off the surplus edges of wall paper and applying paste to the back of the paper prior to hanging on a wall, the machine being also applicable for other purposes.

A lawn cutter has been patented by Mr. Henry L. Sprague, of Tottenville, N. Y. The knives are operated by means of levers resting in grooves in a revolving drum on the axle, the two vibrating cutting bars working so that the machine is adapted to cut grass of any length required, and will be reliable in operation whether the grass be long or short.

A process of curing moss has been patented by Mr. Charles F. Lottman, of Houston, Texas. It consists in forming the moss into tightly compressed bales, keeping the material well saturated, piling the bales closely together and allowing them to stand for a number of days, then washing and ginning the moss and allowing it to dry.

A trace bearer point has been patented by Mr. Edward Armstrong, of Burlington, Kansas. This invention covers a point plate fitted over the lower end of the trace bearer, by which a strong, firm fastening is provided, the end of the bearer will be always covered and protected, and the fastening is one that can be quickly applied and easily detached.

An apparatus for cutting garments has been patented by Eunice Hood, of Bradford, Pa. It consists of an improved dress chart, with neck curve, arm piece, neck scale, shoulder scales, guide mark scales, arm hole scales, and other novel features, in connection with rule for cutting, to facilitate the convenient and accurate cutting of garments.

A nut lock has been patented by Messrs. David N. Bay and William H. Fowler, of Cambridge, Ohio. The nut-locking bar is formed of two parts which slide on each other and are held engaged with two adjacent nuts by means of a spring, the invention being especially applicable with bolts for securing fish plates to railroad rails and similar uses.

A bell cord coupling has been patented by Mr. David S. White, of Huntley, Ill. It consists of a hook with a sliding, spring-actuated metallic sleeve carrying an elastic sleeve capable of projecting beyond the end of the hook in the coupling and of being withdrawn, so as to expose the hook while the cords are being coupled, making a coupling not liable to break car windows when uncoupled.

A well digging apparatus has been patented by Mr. William Lowman, of Marionville, Pa. This invention covers a peculiar construction and arrangement of a mast with braces, treadle, lever, link, rope and pulley, for operating drilling tools by man power, making an apparatus quickly set up and taken down, and that can be easily folded and carried by a single wagon.

An apparatus for distilling wood has been patented by Mr. Elbert J. Burrell, of Ætna, Tenn. This invention relates to the utilization of gases given off in the carbonization of wood, and to the handling of condensable gases emanating from charcoal kilns by exhausting them through a series of condensers and forcing them through another separate set of condensers.

A hoisting net has been patented by Messrs. Zeanas S. Burrell and George W. De Vor, of Brooklyn, N. Y., and John J. Pennal, of Jersey City, N. J. The invention covers principally the providing of a surrounding cable, with bridle pieces, designed to connect with the hook of the hoisting block, to distribute equally the strain and prevent escape of the load, in nets used for loading and unloading small freight.

A chimney has been patented by Mr. Joseph A. Hodel, of Cumberland, Md. This invention covers a casting for building in the top of the flue, with a lateral extension and an inwardly projecting flange, a flue section supported upon the offset of the casting, and having a perforated cover, with other novel features, the construction being such as to protect the portion of the building next the chimney, and present a neat top.

A cotton press has been patented by Messrs. William H. Meador and Rius Carl, of Grenada, Miss. The box has hinged sides and removable end pieces, with hinged top, with follower and compression levers, the automatic side doors having retaining straps, and there being other novel features, it being designed that with this press a bale of cotton can be compressed inside of a minute and a quarter.

A horse power for stackers has been patented by Mr. Absalom H. Hoffman, of Littleton, Iowa. A vertical shaft is mounted in a frame, a horizontal lever on the end of the shaft being arranged for hitching a team of horses, whereby motion is communicated to a horizontal shaft in such way as to wind a rope on a drum to raise a load, the operation being easily controlled by a lever convenient to the operator.

A thermostat for incubators has been patented by Mr. Clarence L. Wells, of Quincy, Ill. Combined with an expanding device or box having a vent is a valve arranged to normally close the vent, with a plate adapted to be operated by the expansion and contraction of the contents of the expanding device or box, with other novel features, the device being also calculated to serve for a variety of uses.

A hat felting machine has been patented by Mr. James C. Grant, of Newburg, N. Y. By this invention the hat bodies, soaked in hot water and wrapped in cloths, are passed between revolving rollers, and compressed and shrunken or sized by the convergence of the same, the operation being several times repeated, and the sizing rollers brought nearer together, until the hat bodies are shrunken and fitted to the required degree.

A means for filtering has been patented by Mr. Heinrich Stockheim, of Mannheim, Germany. The receptacle is divided into two compartments by a central partition, and the filtering bodies placed therein above each other, there being also perforated plates with two covers with studs or projections covered with rubber blocks, with a device for pressing the covers inward, so that the latter exert a simultaneous pressure upon the filtering bodies.

A fifth wheel for vehicles has been patented by Mr. Henry Hafker, of New York City. The annular bearer or plate has upper and lower recesses separated by a web to receive the head block and hounds ring plates, combined with anti-friction rollers journaled in the web and projecting at their peripheries through the web into the ring plate recesses, with other novel features, making a device adapted for easy working with new or old vehicles.

A hoof trimming machine has been patented by Mr. Rufus Parrish, of Troyville, N. C. It is a combination of a sliding and spring-pressed block carrying a knife with a lever for operating the block, an independent and inclined hoof support in front of the knife, and means for changing the inclination of the hoof support with respect to the knife, to facilitate accurate trimming of the edges of the hoofs of horses and mules previous to shoeing.

A wagon axle has been patented by Mr. Cornelius M. Regan, of Brooklyn, N. Y. (communications referring to which to be addressed to Mr. A. M. Levy, 760 Myrtle Av., Brooklyn, N. Y.). The axle is formed with an encircling flange which overlaps the inner end of the box, excluding sand and dust, and in the upper portion of the axle is an oiling groove formed to prevent too rapid flow of oil, and so arranged that the axle may be conveniently lubricated without removing the wheel.

A gold washing machine has been patented by Mr. Henry G. Blodget, of Harrisburg, Oregon. It has two concentric cylinders revolving in a tank of water, one within another, the inner cylinder perforated, and the inner surface of the other cylinder lined with silver plated copper plates charged with quicksilver, a hopper feeding the sand and quartz pulp into the inner cylinder, when the machine operates to take out the particles of free gold, however light they be. [For particulars in reference to this patent address F. A. Bancroft & Co., East Portland, Oregon.]

The recovery of tin from scraps of tinned plate forms the subject of a patent issued to Mr. Wilhelm Hasenbach, of Mannheim, Germany. Hydrochloric acid is employed to obtain protochloride of tin and protochloride of iron, and the combined solutions are mixed while being agitated in closed vessels at the ordinary temperature with finely divided carbonate of lime until a sample of the filtered liquid no longer contains tin; by a subsequent treatment with sulphuric acid the hydrochloric acid is recovered, and pure protoxide of tin is obtained by a still further treatment, when the protoxide can be reduced to metal or treated directly to obtain tin salts.

Special.

HE WOULD NOT PAY A CENT FOR IT.

A gentleman in Birmingham, Ala., seventy-five years of age, who had suffered with gout for thirty years, was recommended by a friend to try the Compound Oxygen, but he had so little faith in it that he "would not pay a cent for it." This friend then sent for a Treatment, and he consented to try it. At that time he was suffering with intense pain in knees and feet; the latter much swollen. Was greatly emaciated, and had been prostrated for weeks at a time. A few weeks since this friend visited him, and then wrote as follows.

"COLUMBUS, ALA., June 15, 1886.

"I have just returned from visiting Mr. Ward, and was highly pleased to find him greatly improved. He and his wife are in high spirits. He has had a terrible time for months. Feet, hands, ankles, and knees had been terribly swollen. For months and months he had not been able to have even a part of a night's sound sleep. After commencing the Home Treatment he had one of his worst spells for two or three days, and had given up all hope even of the Compound Oxygen. But he stuck to it. The first of last week he got one night's good, refreshing sleep. When he awoke the next morning he said to his wife, 'I have had a good night's sleep for the first time in months. But this is only temporary. I fear I shall not be able to sleep any to-night.' But he did, and every night since he has slept well. He told me, on Sunday, that his hands were in their natural shape now, for the first time in many months, and that he believed the swelling in the knees and ankles would now subside, as they were itching a great deal."

In the Treatise on Compound Oxygen can be found a full history of the remedy, and a large list of many more such interesting cases, which will be sent free by addressing Drs. Starkey & Palen, No. 1529 Arch Street, Philadelphia, Pa.

Business and Personal.

The charge for Insertion under this head is One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in next issue.

Inventors' and Manufacturers' Exhibition, Boston.—Parties having inventions for sale, or wishing to exhibit their goods, address Chas. Babson, Jr., 24 Congress St., Boston, Mass.

Wanted—Some one to manufacture barrel covers, patented October 5, 1886. Wirt Hodsden, Smithfield, Va.

Wanted—Second-hand engine and boiler, about 50 horse, modern construction, and not much used. Address box 1439, Middletown, N. Y.

All Books, App., etc., cheap. School of Electricity, N.Y.

Capitalist Wanted—To take interest in a new patent tricycle. Has no rival machine. Can be seen and particulars had by applying to M. M. & W. B. Depuy, Rowland, Pike County, Pa.

Westinghouse Engines.—Two 50 horse power Westinghouse engines. Used less than six months. Good as new. Address Collins Arnold, 676 Broadway, Albany, N. Y.

Wanted—A position of trust and responsibility by a man (age 30, married) experienced in the manufacture and ornamental finishing of metal goods, foundry work, and iron construction. A thorough accountant and correspondent; systematic and practical; capable of managing labor, of estimating, and comprehending the details of manufacturing business. C. E. F., P. O. box 773, New York.

United States rights for an egg carrier for sale. Apply, Ed. Chexnayder, New Orleans; or to Wilson & Leach, 585 Broadway, New York.

Stationary and Boat Engines, Boilers, best made, cheapest price. Address Washburn Engine Co., Medina, Ohio.

For the latest improved diamond prospecting drills, address the M. C. Bullock Mfg. Co., 138 Jackson St., Chicago, Ill.

The Australian-American Trading Co., 20 Collins St., West Melbourne. Sole agencies for American novelties desired. Correspondence solicited. Care of Henry W. Peabody & Co., Boston.

The Knowles Steam Pump Works, 113 Federal St., Boston, and 93 Liberty St., New York, have just issued a new catalogue, in which are many new and improved forms of Pumping Machinery of the single and duplex, steam and power type. This catalogue will be mailed free of charge on application.

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The *Railroad Gazette*, handsomely illustrated, published weekly, at 73 Broadway, New York. Specimen copies free. Send for catalogue of railroad books.

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Anti-magnetic shields—an absolute protection from all electric and magnetic influences. Can be applied to any watch. Experimental exhibition and explanation at "Anti-Magnetic Shield & Watch Case Co.," 18 John St., New York. F. S. Giles, Agt., or Giles Bro. & Co., Chicago, where full assortment of Anti-Magnetic Watches can be had. Send for full descriptive circular.

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Supplement Catalogue.—Persons in pursuit of information of any special engineering, mechanical, or scientific subject, can have catalogue of contents of the SCIENTIFIC AMERICAN SUPPLEMENT sent to them free. The SUPPLEMENT contains lengthy articles emoracing the whole range of engineering, mechanics, and physical science. Address Munn & Co., Publishers, New York.

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Nickel Plating.—Sole manufacturers cast nickel anodes, pure nickel salts, polishing compositions, etc. $100 "*Little Wonder.*" A perfect Electro Plating Machine. Sole manufacturers of the new Dip Lacquer Kristaline. Complete outfit for plating, etc. Hanson, Van Winkle & Co., Newark, N. J., and 92 and 94 Liberty St., New York.

Wanted—A Draughtsman. Address "Mechanic," P. O. Box 773, N. Y.

Iron Planer, Lathe, Drill, and other machine tools of modern design. New Haven Mfg. Co., New Haven, Conn.

Catalogue of books on civil and mechanical engineering, electricity, arts, trades, and manufactures, 116 pages, sent free. F. & F. N. Spon, 35 Murray St., New York.

Guild & Garrison's Steam Pump Works, Brooklyn, N. Y. Pumps for liquids, air, and gases. New catalogue now ready.

Wanted—A Good Machinist to act as Millwright in an iron works. Address B. W. M., P. O. Box 773, N. Y.

Curtis Pressure Regulator and Steam Trap. See p. 253.

Iron and Steel Wire, Wire Rope, Wire Rope Tramways. Trenton Iron Company, Trenton, N. J.

Power, 113 Liberty St., N.Y. $1 per yr. Samples free.

Chucks—over 100 different kinds and sizes in stock. Specials made to order. Cushman Chuck Co., Hartford, Ct.

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The Improved Hydraulic Jacks, Punches, and Tube Expanders. R. Dudgeon, 24 Columbia St., New York.

Friction Clutch Pulleys. D. Frisbie & Co., N.Y. city.

Veneer Machines, with latest improvements. Farrel Fdry. Mach. Co., Ansonia, Conn. Send for circular.

Tight and Slack Barrel Machinery a specialty. John Greenwood & Co., Rochester, N.Y. See illus. adv., p. 28.

Ax handle and spoke lathes. Railway cutting off saw machines. Rollstone Machine Co., Fitchburg, Mass.

Lick Telescope and all smaller sizes built by Warner & Swasey, Cleveland, Ohio.

Send for new and complete catalogue of Scientific Books for sale by Munn & Co., 361 Broadway, N. Y. Free on application.

NEW BOOKS AND PUBLICATIONS.

THE MANUFACTURERS OF THE UNITED STATES. 1887. New York: Armstrong & Knauer Publishing Company. Pp. clxiii., 792.

In this work lists of the manufacturers of this country and of the articles made by them are given. The work is divided into two sections. The first is an alphabetical list of articles, under each of which appears the names of firms manufacturing it, with their addresses. The second section is divided by trades; eighty-nine different trades are comprised in it, and under each trade appears the names of the proper firms. Both sections are very fully indexed. The work is very thorough and as complete as possible, and is a most valuable manual for the business man. We cordially recommend the work, and hope that the business houses of the country will, by their patronage and interest, add to its value every year.

ELEMENTARY MICROSCOPICAL TECHNOLOGY. Part I. The Technical History of a Slide. By Frank L. James, Ph.D., M.D. Pp. 107. St. Louis Medical and Surgical Journal Company, St. Louis, Mo., 1887.

In this little work, the first of three parts which are to complete the treatise, the preparation of slides for the microscope is very fully treated of. Hardening processes, the preparation of sections, including the description of representative microtomes, preservation of the material in moss, embedding, and similar subjects are accorded full descriptions. Staining animal and vegetable tissues is next considered. The preparation of the slip follows, including numerous recipes for cements and hints and directions as to their application. Mounting media, both aqueous and balsamic, are described, and, with the methods of using, are the subjects of two chapters. An appendix on parenchymatous embedding and dry section cutting, with a copious index, conclude Part I. We await with interest the reception of the other two parts.

ELEMENTS OF PHYSIOLOGICAL PSYCHOLOGY. By George T. Ladd. New York: Charles Scribner's Sons, 1887. Pp. xii., 696.

In this admirable work by Professor Ladd, of Yale University, is given a very elaborate account of what is known of the obscure relations existing between the substantial and spiritual elements in the human organism. It is a study of the oft mooted question of the correlation of vital and physical force. A work of seven hundred octavo pages as concisely written as this, and on such weighty subjects, cannot be reviewed within our limits. It is enough to say that the author displays in it a very full acquaintance with the physiology of the subject, and exhibits the fruits of very extensive reading. Over a hundred wood cuts are contained, scattered through the text. The result of the work is to show what is known on the subject, and not only this, but to demonstrate also how little this is, and how futile the attempts to reduce the spiritual forces to a mechanical basis have been. The final paragraphs very forcibly bring forward the limitations of psychology, and formulate the conclusion that the origin and destiny of what the author terms "the mind" are beyond the present scope of physiological psychology. The wise conservatism of the author makes his work doubly valuable.

A MANUAL OF WEIGHTS AND MEASURES. By Oscar Oldberg, Pharm.D. Pp. iii., 246. Charles J. Johnson, Chicago, Ill., 1887.

The title of this work suggests its contents. The entire subject of weights and measures is treated of. The care of weights and balances, the necessary features of each, materials for their construction, and methods of cleaning are the more practical features. The relations of different systems of weights and measures are naturally very fully treated, many tables being embodied in the text. The Swedenborgian system of octonary notation, in which eight was to be the basis, as ten is now, and the many attempts at providing a natural standard are described. The author recognizes the importance of the decimal system. He proposes a readjustment of the present apothecaries' weights to meet it. He would make the grain equal to one-sixteenth gramme. Carrying out this change, the simplest possible ratio between the two would be created, and the departure from the absolute apothecaries' standard would be but slight. The manual is very comprehensive, and though evidently written from a pharmacist's standpoint, is of considerable interest to chemists and physicists.

* * Any of the above books may be purchased through this office. Send for new catalogue just published. Address Munn & Co., 361 Broadway, N. Y.

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Notes & Queries

HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters, or no attention will be paid thereto. This is for our information, and not for publication.

References to former articles or answers should give date of paper and page or number of question.

Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all, either by letter or in this department, each must take his turn.

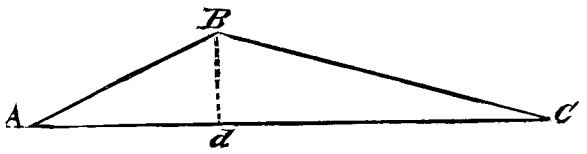
Special Written Information on matters of personal rather than general interest cannot be expected without remuneration.

Scientific American Supplements referred to may be had at the office. Price 10 cents each.

Books referred to promptly supplied on receipt of price.

Minerals sent for examination should be distinctly marked or labeled.

(1) T. H. & W. S. ask for the rule for determining the power exercised by an elbow joint press. A. Let A B C be the elbow joint system. Measure the distances A C, A *d*, and *d* B. These will of



course vary for every position of the press. Then to obtain the end pressure use the following formula, in which R denotes the pressure, and P the power applied at B in the direction B *d*.

$$R = P \cdot \frac{d\,C}{A\,C} \cdot \frac{A\,d}{d\,B}$$

If the arms A B and B C are of equal length, the formula reduces to $R = P \frac{A\,d}{2\,d\,B}$

(2) H. N. asks the quickest and best way to drill holes for water pipes in rough plate glass. A. Use a hardened (file temper) drill, with spirits of turpentine and camphor to make the drill bite. A broken file in a breast brace will do good work if a power drill is not obtainable.

(3) W. H. H. asks if old putty in old window sash can be softened so as to be easily taken out. A. Take 1 part American pearl ash, 3 parts stone quick lime; slake the lime, add the pearl ash, and bring the whole to the consistence of paint. Apply it to the sash, and let it remain for 12 hours, when the putty will be softened.

(4) J. B. C.—The polar position of the sun has not yet been exactly located. Its approximate polar point among the stars may be assigned, but is of no value in astronomical work, and is not mentioned in books.

(5) C. H. K. writes: I have a bell weighing probably 1,000 pounds, that has cracked from the mouth or rim upward some 14 inches. Can I save it and retain its original tone by drilling at end of crack and sawing out? A. Drill a quarter inch hole at the end of the crack, and saw the crack open, so that the vibrations will not produce a contact of the edges. This will change the tone of the bell. It must be struck on the opposite side from the crack.

(6) H. P. S. writes: I have in use a number of paper lamp shades for coal oil lamps which are yellow and sooty on the inside, but otherwise good. Is there any white composition with which I can paint the inside so as to increase the reflection? A. An oxide of zinc paint might be used. Cannot white cardboard be pasted on the inside of the shade?

(7) M. W. C. asks: 1. How can I take the rust from a tin lantern and make it bright? A. If the rust is not too deep, it can possibly be removed by treating with kerosene oil, or mix the oil and rub with a little rouge. 2. I have an electric lamp, and every few nights after putting it out the chimney breaks. Can you tell me how to prevent it? A. Anneal the glass by putting into cold water and gradually heating until boiling, then cool. 3. How can I flavor home made chewing tobacco and make it sweet? A. Use glycerine.

(8) E. D. A. asks the specific gravity of linseed and cottonseed oil. Also, the boiling degree, and probable adulteration. A. Linseed oil has a gravity of 0·93515, and boils at 600° Fah. The gravity of cottonseed oil is 0·9306. Both are extensively adulterated, the former with the latter, and also with resin oil, fish oil, and others. The percentage of adulteration can only be generally estimated.

(9) H. F. S. asks (1) how to wind an induction coil for a telephone, and if a telephone will work without one. A. The primary of a telephone induction coil is wound with No. 18 to No. 24 wire to a resistance of ½ ohm. The secondary is wound around this with No. 36 wire and a resistance of 80 ohms. A telephone will work without one, but not so satisfactorily for long distances. 2. What effect has an induction coil on a telephone line, and how is the difference effected? A. The induction coil generates a line current of high tension and small quantity, which is not affected by resistance to the same extent that a battery current would be. The result is effected by the inductive action of the primary on the secondary.

(10) O. P. asks which travels the faster, light or electricity, and at what rate per second? A. Electricity under favorable circumstances has been found to travel at the rate of 288,000 miles per second. Light travels at 190,000 miles per second. Under less favorable circumstances, electricity travels with comparative slowness.

(11) F. B. asks how to make a paste harness blacking. A. Dissolve by heat 4 ounces glue or gelatine and 3 ounces gum arabic in ¾ pint of water; add 7 ounces molasses and 5 ounces ivory black in very fine powder, gently evaporate until of proper consistence when cold, stirring all the time. Keep in corked bottles.

(12) S. S. H. writes: I want to find out the best wash or lotion for tightening the wrinkled skin on hands and face. A. Take of oil of almonds 4 ounces avoirdupois, hog's lard 3 ounces, spermaceti 1 ounce; melt, add of expressed juice of horse leek 3 Imperial fluid ounces, and stir till the mixture solidifies by cooling. A few drops of lavender or eau de cologne are added to scent the mixture.

(13) W. L. R. asks how to make a powder for silver plating. By simply moistening it, it gives a good plating. A. Mix 1 part chloride of silver with 3 parts pearl ash, 1½ part common salt, and 1 part whiting, and rub the mixture on the surface of brass or copper (previously well cleaned), by means of a piece of soft leather or a cork moistened with water and dipped into the powder.

(14) W. I. asks: How am I to separate the gelatine contained in meat? For instance, I take a certain quantity of beef, and boil it down; How am I to get rid of the gelatine in the concentrated product? A. On a small scale, the gelatine can be precipitated by alcohol, or for manufacturing purposes see the U. S. Dispensatory under title of extract of meat, where the entire method of manufacture is given.

(15) C. De V. asks how bottlers fine their liquids so that they will not be cloudy. A. For this purpose 1 ounce isinglass is put into 1 quart weak vinegar or, still better, hard beer, and when dissolved, a sufficient quantity of good beer may be added to make 1 gallon. This mixture is called finings, and 1 to 2 pints of it is the proper quantity for a barrel. When used for other drinks besides beer, dilute with the special drink which it is desired to fine. Bottling machinery and carbonic acid generators are made a specialty by a number of firms.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted

May 17, 1887,

AND EACH BEARING THAT DATE.

[See note at end of list about copies of these patents.]

Alarm. See Fire alarm.
Animal trap, J. C. Gould ... 362,952
Annealing furnace, B. Howell ... 363,292
Annunciator, E. D. Clapp ... 363,315
Asbestine leaden texture, I. Steinhart ... 363,018
Asphalt concrete for paving purposes, apparatus for the manufacture of, H. Franke ... 363,132
Atomizer, G. Kneuper ... 363,247
Automatic brake, C. F. Moore ... 363,251
Automatic switch, J. C. Loury, Jr ... 363,075
Awning, W. R. Mason ... 363,155
Axle nut attachment, G. W. Amos ... 362,922
Axle setter, L. G. Harding ... 363,135
Bag. See Satchel bottom bag. Traveling bag.
Bag holder, J. Saurer ... 363,172
Bag lock, Jones & Mains ... 363,337, 363,338
Bag or pocket book frames, fastening for, C. Blust ... 363,042
Bale tie hook, E. L. Clock ... 363,116
Baling press, E. C. Sooy ... 363,012
Baling press, C. E. Whitman ... 363,269
Baling press, Poor & Woulf ... 362,994
Baling press and feeder, combined, Thompson & Isham ... 363,095
Balloons, means and apparatus for propelling and guiding, C. R. E. Wulf ... 363,037
Bar. See Clothes bar.
Bath tub, W. Cliff ... 363,048
Battery. See Pocket battery.
Bell cord coupling, D. S. White ... 363,266
Bench. See Wash bench.
Bengal lights, composition for, C. Gerhard ... 363,224
Binder, temporary, T. H. Brown, Jr ... 363,277
Blackleading machine, G. E. Lloyd ... 362,983
Blank depository, C. A. Rieder ... 363,083
Blast apparatus, T. O. Johnson ... 363,294
Blasting barrel for extracting tree stumps, C. Heaton ... 363,233
Blocks, machine for cutting round, O. C. Fenlason ... 363,222
Bobbin or cop tube, Essex & Ball ... 363,326
Boiler. See Steam boiler.
Bolt, H. H. Lockwood ... 363,074
Bolt fastener, T. Taylor ... 363,021
Book holder and cover, C. H. Bartlett ... 362,925
Boots or shoes, edge plane for trimming the sole edges of, A. J. Avery ... 363,107
Boots or shoes, sole and heel edge blacker for, O. F. Drew ... 363,051
Borer and reamer, combined, J. P. Champion ... 362,934
Box. See Cigar box. Knockdown box.
Bracelet, A. Williams ... 363,309
Brake. See Automatic brake. Car brake. Sleigh brake.
Branding apparatus, Meyer & Illig ... 363,160
Bridge gate, J. S. Philip ... 363,257
Broach, F. W. Gesswein ... 363,059
Bucket, dinner, B. K. Galbreth ... 362,948
Buckle, harness, Willis & Cowen ... 363,036
Burner. See Gas burner. Vapor burner.
Burning bagasse or other wet material, apparatus for, R. H. Yale ... 363,270
Button, J. Costello ... 363,285
Buttonholes, machine for stitching and cutting, F. Egge ... 362,945
Button machine, W. P. Devine ... 363,214
Button setting machine, J. H. Vinton ... 363,349
Button stapling machine, E. O. Ely ... 363,054
Cable, chain, J. M. Dodge ... 363,216
Cable, chain, W. D. Ewart ... 363,288
Calendar, indicating, A. L. Sewell ... 363,088
Camera. See Photographic camera.
Can. See Sheet metal can.
Can filling machines, automatic feeder for, Hutson & Jones ... 363,068
Candy in bars or sticks, manufacture of rock, J. H. Barker ... 363,195
Car brake, B. F. Crow ... 363,319
Car brake, automatic, R. J. Wilson ... 363,310
Car coupling, P. Brown ... 363,112
Car coupling, C. Lunt ... 363,341
Car coupling, J. W. Newton ... 363,237
Car coupling, J. Rawles ... 362,996
Car coupling, N. Solcer ... 363,303
Car coupling, N. E. Springsteen ... 363,262
Car heater, street, J. L. Brink ... 362,928
Car mover, E. Duplessis ... 363,124
Car, stock, A. G. Minges ... 363,163
Car windows, dust guard for, T. H. Duzan ... 363,125
Cars, watering apparatus for cattle, F. E. Canda ... 363,115
Card holder, G. M. Burgess, Jr ... 363,206
Carding engines, comb plate for doffer combs of, J. W. Bonsack ... 363,199
Carding machines, fleece dividing attachment for, H. D. Bosson ... 363,200
Carpet stretcher, M. B. Spackman ... 363,013
Carriage spring, C. M. Brown ... 363,203
Carriage top, C. C. Lawrence ... 363,147
Cart, road, A. L. Fellows ... 363,221
Cart, road, C. W. Jewett *et al* ... 363,241
Cartridge shells, implement for capping, J. A. Scott ... 363,175
Case. See Measure case.
Caster, furniture, R. Claughton ... 363,047
Casting compound ingots, mould or apparatus for, E. Wheeler ... 363,032
Cement coated nail, I. Copeland ... 362,940
Chair. See Railway rail chair.
Chair back support, W. J. Cowing ... 363,211
Check row attachment, J. W. Barber ... 362,924
Chimney, J. A. Hodel ... 363,236
Churn dasher, S. C. Harrison ... 363,231
Cigar box, L. Haas ... 365,064
Cigar rolling machine, O. Hammerstein ... 363,065
Cigar shaper, E. W. Seymour ... 363,301
Cleaner. See Railway track, frog, and switch cleaner.
Clevis, E. I. Morey ... 363,252
Clock cover, W. C. Camp ... 362,932
Clocks, electric striking device for, S. C. Dickinson ... 363,215
Closet seat, W. Jacobus ... 362,969
Clothes bar, folding, D. M. Pickett ... 363,081
Clutch, G. W. Shamp ... 363,006
Coffin cap lifter, C. A. Bailey ... 363,312
Coin tray, C. E. Howe ... 363,239
Combination lock, G. R. Boyce ... 363,110
Commutator adjuster, automatic, E. Thomson ... 363,184
Compass and marine indicator, recording, R. W. F. Abbe ... 363,039
Compass, instrument for ascertaining the variation of the, H. Harild ... 362,960
Concentrator for artificial lights, H. H. Smith ... 363,010
Cooler for beer and other liquids, W. Sloppz ... 363,177
Cooling and condensing apparatus, E. Theisen ... 363,094
Cores, method of and apparatus for forming armature, F. Wynne ... 363,106
Cotton press, Meador & Carl ... 363,159
Counter seat, adjustable, F. W. Gowell ... 363,226
Coupling. See Bell cord coupling. Car coupling. Shaft coupling. Thill coupling.
Crate, folding, E. B. Merritt ... 363,077
Crimping machine, J. W. D. Fifield ... 363,055
Cultivator and planter, combined, W. R. Parnell ... 363,299
Cultivators, attachment for wheel, W. R. Brown ... 363,278
Cup. See Grease cup.
Cut-off, adjustable, W. F. Parish ... 363,255
Cutter. See Lawn cutter. Sheet metal scroll cutter.
Cyclometer, M. H. Downes ... 363,218
Damper regulator for furnaces, stoves, etc.; automatic, C. L. Ridgway ... 363,346
Damping machine, F. L. & S. G. Goss ... 363,326
Dental engine, W. W. Grant ... 363,291
Dental flasks, etc., press for, M. M. Maine ... 363,152
Derrick, J. B. Wallace ... 363,101
Digger. See Potato digger.
Dish drainer, C. C. Cannom ... 363,045
Distilling wood, apparatus for, E. J. Burrell ... 363,313
Door hanger, J. Charlton ... 362,937
Door hanger, J. H. Lawrence ... 363,148
Door securer, H. F. Keil ... 363,145
Drawer, J. W. R. Johnson ... 363,242
Drawing table, Kidder & Long ... 363,339
Drawing table, T. W. Mann ... 363,154
Drug mixing machine, M. J. Jones ... 362,971
Ear stud, F. Wessel ... 363,030
Eaves trough angle or miter, L. M. Bowers ... 363,044
Electric generator, self-exciting alternate current, J. W. Easton ... 363,126
Electric lighting systems, indicator for, W. J. Hammer ... 363,333
Electric machine, dynamo, J. W. Easton ... 363,128
Electric machines, method of and apparatus for detecting short circuits in dynamo, J. W. Easton ... 363,129
Electric machine, safety contact brush for dynamo, J. W. Easton ... 363,127
Electric motor, alternating current, E. Thomson ... 363,185
Electric switch, E. Thomson ... 363,183
Electrical matting, A. H. Freeman ... 363,290
Electrical switch, W. J. Hammer ... 363,334
Electrotypes, blackleading matrices for, E. A. Blake ... 362,927
Elevator, G. M. Davis ... 363,121
Elevators, automatic safety appliance for, E. J. Shaw ... 363,302
Engine. See Dental engine. Steam engine.
Engine, S. Robinson ... 363,085
Etching zinc and other metal plates, L. W. Kipp ... 362,974
Extractor. See Tobacco plug extractor.
Eyeglass, M. C. Brackett ... 363,201
Eyeglasses, manufacture of cases for, W. B. White ... 363,267
Eyelet tape, W. Pretty, Jr ... 362,995
Farm gate, A. C. Baumwart ... 363,108
Faucet, weighing, T. J. Black ... 363,273
Feed rack, D. W. Shorter ... 363,089
Feeder, coagulant, J. W. Hyatt ... 362,966
Felt, manufacture of, A. Dolge ... 363,217
Fence and water gate, combined, F. D. Wilson ... 363,350
Fence, flood, P. H. More ... 362,988
Fence machine, G. J. Cline ... 363,316
Fence, metallic, W. W. Hamilton ... 363,227
Fence tightener, wire, L. A. Butts ... 363,314
Fence, wire, J. G. Schiller ... 363,003
Fertilizer distributor and seed drill, combined, C. D. Daniels ... 362,943
Fifth wheel, H. Hafker ... 363,134
Filter, water, W. H. Cummings ... 363,120
Filtering, H. Stockheim ... 363,019
Fire alarm, A. W. Geer ... 362,949
Firearm, breech-loading, V. Bovy ... 363,043
Fire escape ladder, Hanes & Shaver ... 362,959
Fire extinguisher, J. Tonge ... 363,187
Fireplace and flue, portable, J. W. Cooper ... 363,210
Fish trap, J. M. Treat ... 363,263
Flowers from fur, manufacture of imitation, E. Friedlander ... 363,058
Flushing tank, T. H. Platt ... 363,166
Frame. See Photographic printing frame.
Fruit gatherer, E. E. Evans ... 363,220
Fruit picker, B. M. Moyer ... 363,078
Furnace. See Annealing furnace. Gas generating furnace. Glass melting furnace. Welding furnace.
Furnace, S. G. Lane ... 362,979
Furnace, J. Springer ... 363,261
Furnace, E. W. Tucker ... 363,264
Gauge. See Water gauge. Woodworking machine gauge.
Game apparatus, O. N. Kyle ... 363,146
Garments, apparatus for cutting, E. Hood ... 363,237
Gas burner, J. Irwin ... 362,968
Gas device, safety illuminating, J. H. Musgrave ... 363,343
Gas generating furnace, H. B. Van Benthuysen ... 363,023
Gases, process of and apparatus for charging liquids with, G. Schenck ... 363,173
Gas regulator and cut-off, T. J. Kieley ... 362,973
Gate. See Bridge gate. Farm gate. Railway gate. Swinging gate. Toll gate.
Gate, E. E. Hess ... 362,962
Gate, J. H. Uhle ... 363,099
Gate closer, W. B. Nelson ... 363,253
Generator. See Electric generator. Hydrocarbon generator.
Glass melting furnace and regenerator, F. Heintz ... 362,961
Glassware, fancy, J. Webb ... 363,190
Glove fastener, S. W. Shorey ... 363,347
Glue, apparatus for evaporating and bleaching, A. J. Ward ... 363,026
Gold washing machine, H. G. Blodget ... 363,198
Grader, road, H. G. Moats ... 363,342
Grain and seed, machine for gathering, L. W., Jr., & R. E. L. Leavell ... 363,075
Grain, etc, apparatus for torrefying, J. F. Fordred ... 363,057
Grain binders, knotter for, W. N. Whiteley *et al* ... 363,268
Grain binders, sheaf carrier for, W. Butterfield ... 362,930
Grain conveyer, portable, A. F. Carlson ... 363,282
Grain drill tube, T. R. Crane ... 363,286
Grain or cereals, preparing, J. Fordred ... 363,056
Grate, A. S. Newby ... 363,344
Grate and fire back for fireplaces, J. W. Wolfe ... 363,308
Grates and fireplaces, extension screen for, J. G. Smith ... 363,178
Grease cup, compression, D. H. McCarty ... 363,156
Gun barrels, device for cleaning, S. H. Heginbottom ... 363,137
Gun sight, G. W. Hadley ... 362,956
Halter, W. H. Wheeler ... 363,033
Halter trimming, A. B. Arnold ... 363,311
Hammock, V. P. Travers ... 363,096
Hammock support and canopy top, combined, T. Ferguson ... 363,223
Hanger. See Door hanger.
Harmonica, A. P. S. Jones ... 362,970
Harrow, W. P. Bonham ... 363,274
Harrow, J. A. Morsman ... 362,990
Harrow, two-wheeled, Glass & Kimball ... 362,950
Harvester, G. H. Spaulding ... 363,014
Hasp lock, F. W. Mix ... 362,986
Hasp lock, J. Shaw ... 363,008
Hat felting machine, J. C. Grant ... 363,329
Heat, generating, T. H. Champion ... 362,935
Heater. See Car heater. Vehicle heater. Water heater.
Heddle for cross weaving, C. A. Littlefield ... 363,072
Hides, machine for treating, Lichtenberg & Baloun ... 363,295
Hobby horse, Crandall & Snyder ... 362,941
Hoisting apparatus, C. R. Traxler ... 363,097
Hositing bucket, B. F. Wilson ... 363,105
Holder. See Bag holder. Book holder. Card holder. Music and book holder. Music or paper holder. Pencil and crayon holder. Spool holder.
Hoof trimming machine, R. Parrish ... 363,256
Hook. See Bale tie hook.
Horse power for stackers, A. H. Hoffmann ... 363,139
Horseshoe, detachable, C. V. Geschke ... 363,225
Hot water heater, circulating, Owen & Fuller ... 363,165
Hydrocarbon generator and burner, J. McHale ... 362,984
Ice making and blocking machine, G. F. Knox ... 363,248
Incubator thermostat, C. L. Wells ... 363,307
Indicator. See Station or street indicator.
Inhaler, R. B. Heintzelman ... 363,067
Initial ring, interchangeable, W. Meerbott ... 363,076
Injector, L. Schutte ... 363,004
Insulated electric conductors, covering, J. Tatham ... 363,182
Jack. See Lifting jack. Stone laying jack. Wagon jack.
Joint. See Rail joint. Railway joint.
Journal bearing, H. Brown ... 363,204
Knee pad and protector, A. G. Ridgill ... 363,170
Knitting machine needle, G. Malpass, Jr ... 363,153
Knockdown box, H. P. Huston ... 363,143
Label for packing cases, reversible, C. M. Beninghaus ... 362,926
Lace fastener, W. M. Brinkerhoff ... 363,276
Ladder, fire, L. Harris ... 363,066
Lamp chimneys, tempering, M. Schreiber ... 363,087
Lamp, oil, C. Colahan ... 363,284
Lamps, device for attaching and detaching electric, W. J. Hammer ... 363,332
Lamps, etc., suspension device for, J. D. Griswold ... 363,063
Lantern, F. Meyrose ... 363,161
Last, T. A. Kelly ... 363,069
Lasting machine, F. Chase ... 363,283
Lathe, watchmaker's, E. Rivett ... 363,000
Lawn cutter, H. L. Sprague ... 363,260
Leather skiving machine, J. N. Whitcomb ... 363,265
Level, spirit, J. Holly ... 363,140
Lever press, sector, G. W. Grader ... 362,953
Lifter. See Coffin cap lifter.
Lifting jack, A. K. Bagwell ... 363,194
Lifting jack, J. A. Dill ... 363,050
Loading apparatus, P. H. Grimm ... 363,062
Lock. See Bag lock. Combination lock. Hasp lock. Nut lock.
Lock for pocketbook or satchel frames, M. C. Schmidt ... 363,174
Loom heddle, C. K. Sawyer ... 363,002
Loom shuttles, thread guiding and tension regulating device for, J. C. Sergeson ... 363,005
Looms, reed supporting device for, O. S. Lee ... 362,980
Lumber piler, C. E. Dunshee ... 363,287
Mail bag fastener, S. A. Field ... 363,130
Measure case, tape, W. Keuffel ... 363,070
Mechanical movement, H. K. Whitner ... 363,103
Metals, by the direct application of the electric current, process of and apparatus for working, De Benardos & Olszewski ... 363,320
Milk can cover, O. Smeader ... 363,090
Mill. See Rolling mill.
Mirror, folding, P. Wiederer ... 363,102
Mitering machine, J. T. Criswell ... 363,119
Moulding machine, marble, Riehle & Hatcher ... 362,999
Mortising machines, chain cutter for, C. H. Douglas ... 363,123
Mortising tool, F. V. Phillips ... 363,080
Moss, curing, C. F. Lottman ... 363,150
Motor. See Electric motor.
Motor device, alternating current, E. Thomson ... 363,186
Mowers, grass receiver for lawn, H. H. Tapper ... 363,093

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Mowing machine, A. Ellis ... 362,946
Music and book holder, W. J. Hammer ... 363,228
Music or paper holder, E. R. Horton ... 363,142
Musical instruments, pneumatic action for, Pritchard & Ahlstrom ... 363,082
Nail. See Cement coated nail.
Necktie fastener, J. G. Davy ... 363,212
Net, hoisting, Z. S. Burrell *et al* ... 363,113
Nitro-cellulose, granular, R. Bernstein ... 363,197
Numbering tickets, apparatus for, W. R. Bacon ... 363,193
Nut lock, Bay & Fowler ... 363,196
Nut lock, P. Dunn ... 363,052
Nut lock, J. W. Spafford ... 363,259
Oranges, apparatus for assorting, G. S. Riggs ... 363,084
Organ, G. B. Kelly ... 363,245
Pad. See Knee pad.
Paper, apparatus for drying coated sheets of, Hooper & Hollingsworth ... 363,335
Paper cleaning compound, W. J. Dane ... 362,942
Paper trimming and pasting machine, J. D. Hooper ... 363,141
Paring and coring machine, apple, W. & H. A. Tripp ... 363,022
Pasteboard mailing tube, G. E. Grimm ... 363,061
Pencil or crayon holder, H. D. Caruso ... 362,933
Perforating seat frames, machine for, J. M. Nash. 363,164
Photographic camera, J. Krementz ... 362,978
Photographic printing frame, G. H. Chesebro ... 363,209
Pianofortes, keyboard for, W. H. Ivers ... 363,240
Picker. See Fruit picker.
Pin. See Safety pin.
Pipes, covering for steam, H. F. Watson ... 363,028
Plane, hand or jack, L. A. Dearth ... 363,213
Planing and matching machines, guide for, W. M. Dwight ... 363,322
Planter, check row corn, I. N. Tusing ... 363,306
Planter, corn, Shanks & Daily ... 363,007
Plow, C. Billups ... 363,109
Plow, double shovel, T. W. Palmer ... 363,298
Plow, side hill, E. W. Horton ... 363,238
Pocket battery, L. T. Stanley ... 363,304
Potato digger, G. M. Clark ... 363,117
Potato digger, E. Traxler ... 363,098
Power. See Horse power.
Press. See Baling press. Cotton press. Lever press.
Pressure and heat regulator, automatic steam, O. B. Brann ... 363,275
Printing, C. T. Moore ... 362,987
Printing bronze on plush, Finger & Menzel ... 363,131
Printing machine, duplex oscillating, O. B. Reynolds ... 362,998
Printing machines, ink roller adjustment for, F. L. & S. G. Goss ... 363,327
Printing machines, sheet delivery for, F. L. & S. G. Goss ... 363,328
Propeller, child's, F. Snyder ... 363,011
Propulsion of vessels, J. H. Kates ... 363,244
Pump, H. A. French ... 362,947
Pump excavator, M. F. Brainard ... 363,202
Pump, sirup, R. E. Huff ... 363,336
Rack. See Feed rack.
Rail joint, L. Anderson ... 363,040
Railway gate, automatic, C. R. Gavit ... 363,133
Railway joint, Hall & Mahoney ... 362,958
Railway rail chair, I. A. Perry ... 363,167
Railway switch, O. E. Swartz ... 365,348
Railway tie, L. Taylor ... 363,020
Railway track, frog, and switch cleaner, C. M. Ingersoll ... 362,967
Railways, device for paying rebates on, C. S. Westbrook ... 363,031
Railways, system of electrical distribution for, McElroy & Nicholson ... 363,250
Rake. See Wheel rake.
Reflector, safety sight feed, W. S. Getchell ... 363,060
Register, border, and box, combined, H. K. Tallmage ... 363,181
Regulator. See Gas regulator. Pressure and heat regulator. Temperature regulator.
Ring. See Initial ring.
Rolling mill, iron, W. G. Howell ... 363,293
Ruler for sign writers, parallel, A. J. Walker ... 363,025
Safe, vault, etc., W. Corry ... 363,118
Safety pin, D. A. Carpenter ... 363,208
Sails, furling top, W. T. Loveland ... 363,340
Sand moulds, core guide for, C. Herman ... 363,138
Saline solutions, apparatus for cooling, W. B. Cogswell ... 362,938
Sash fastener, A. P. Butts ... 362,931
Sash fastener, J. Chantrell ... 362,936
Satchel bottom bag, J. L. Havlin ... 363,232
Sawmills, feed and pressure mechanism for, D. C. Prescott ... 363,169
Saw tempering and straightening machine, E. C. Atkins ... 363,271
Saw tempering and straightening machine, A. Maculen ... 363,296
Sawing machines, feeding device for circular, D. S. Abbott ... 362,921
Scaffolds, shield for bearing bars of painters', M. F. Smith ... 363,179
Scale, automatic grain, P. O. Pederson ... 362,992
Scissors or shears, H. Deichmann ... 363,049
Screen, R. G. Rice ... 363,258
Screw machine, A. Johnston ... 363,144
Seat. See Closet seat. Counter seat.
Seeding machine, broadcast, C. Easterling ... 363,053
Shaft attachment, vehicle, Hare & Sproul ... 363,230
Shaft coupling, safety, R. C. Spinks ... 363,015
Shafting, clutch and stop motion for, M. O. Rehfuss ... 362,997
Shank stiffener, C. F. Baker ... 362,923
Sheet metal can, E. Norton ... 362,991
Sheet metal, ornamenting, T. W. Burger ... 363,205
Sheet metal scroll cutter, A. O. Kittredge, 362,975 to 362,977
Shirt neckband, W. Husband ... 362,965
Shutter fastener, J. A. Burr ... 363,207
Signal flag staff, Price & Russell ... 363,345
Sleigh brake, O. A. Gordon ... 362,951
Sleigh runner, S. C. Brownell ... 363,279
Soldering machine, can, W. D. Brooks (r) ... 10,835
Spinning machine spindle support, W. F. Draper. 362,944
Spinning machines, etc., top drawing roller for, J. Wilcock ... 363,035
Spool holder, F. J. Hall ... 363,330
Spool holder, M. S. Keator ... 362,972
Spout, sap, C. A. Burr ... 363,280
Spring. See Carriage spring.
Springs, machine for fastening the extremities of spiral, H. Spuhl ... 363,092
Square, folding, E. Douglas ... 363,321
Staple fastener, F. A. Smith, Jr ... 363,001
Starch polish, Hochhacker & Sulzer ... 363,235
Station or street indicator, I. H. Miller ... 363,162
Steam and heating rooms, apparatus for generating, O. A. Stempel ... 363,305
Steam boiler, H. Stanton ... 363,017
Steam engine, Ross & Henrikson ... 363,300
Steam trap, J. Kane ... 363,245
Stone laying jack, J. H. Libbe ... 362,982
Stove, E. Bussey ... 363,251
Stovepipe fastening, F. R. Dimick ... 363,122
Stoves, toaster or broiler for gasoline, A. G. Conway ... 362,939
Straw stacker, M. Heinecke ... 363,234
Superheater and hydrocarbon burner, combined, C. T. Schoen ... 363,086
Swinging gate, W. A. Smith ... 363,180
Switch. See Automatic switch. Electric switch. Electrical switch. Railway switch.
Switch stand attachment, J. Roberts ... 363,001
Table. See Drawing table. Transfer table.
Table slide, L. S. Edleblute ... 363,219
Tank. See Flushing tank.
Telegraphy, F. Van Rysselberghe ... 363,188
Telephone, mechanical, J. Lauhoff ... 363,249
Temperature regulator for carburetors, E. J. Frost ... 363,324
Thermoscope, electro-magnetic, H. J. Haight ... 362,957
Thill coupling, D. J. Owen ... 363,254
Tie. See Railway tie.
Tin from scraps of tinned plate, recovery of, W. Hasenbach ... 363,136
Tires, apparatus for setting, P. G. Austin ... 363,272
Tobacco dressing machine, I. T. Hardy ... 363,229
Tobacco plug extractor, F. E. Leslie ... 362,981
Toboggan, J. R. McLaren, Jr ... 363,157
Toll gate, C. W. Green ... 362,954, 362,955
Tool, combination, W. J. Hammer ... 363,331
Trace bearer point, E. Armstrong ... 363,192
Traction engines, device for guiding, G. A. & J. E. Klotz ... 363,246
Traction wheel, C. E. Warner ... 363,027
Transfer table and dock, C. C. Burton ... 363,114
Trap. See Animal trap. Fish trap. Steam trap.
Traveling bag, T. R. Weidemann ... 363,029
Treadle movement, A. M. Fenner ... 363,289
Tub. See Bath tub.
Tube. See Bobbin or cop tube. Grain drill tube. Pasteboard mailing tube.
Tug attachment, hame, W. S. Sherman ... 363,009
Type writers, transmitter for electrical, J. F. McLaughlin ... 363,158
Type writing machine, G. L. Waitt ... 363,100
Valve for steam engines, reversing, P. M. Cross ... 363,318
Valve, steam engine, P. M. Cross ... 363,317
Valve, water tank, H. S. Hopper ... 362,963
Vapor burner, W. P. Butler ... 362,929
Vehicle bodies, corner plate for, E. S. Mead ... 362,985
Vehicle heater and lamp, T. A. Long ... 363,149
Vehicle running gear, G. Girardey ... 363,325
Velocipede, R. Watson ... 363,189
Vise, pipe, Baker & Shevlin ... 363,041
Wagon jack, J. M. Young ... 363,038
Wash bench, M. & B. Wilcox ... 363,104
Washing machine, T. J. Christy ... 363,046
Water gauge, safety, J. B. Little ... 363,071
Weather strip, Hull & Kirk ... 362,964
Wedge for tool handles, G. P. Morrill ... 362,989
Welding furnace for heating blanks, J. C. Richardson ... 363,171
Well digging apparatus, W. Lowman ... 363,151
Wells, packer for oil and gas, J. D. Brooder ... 363,111
Wheel. See Fifth wheel. Traction wheel.
Wheel rake, W. H. Wild ... 363,034
Wheelbarrow, J. Peterson ... 363,168
Whistles, electrical device for operating steam, W. M. Pease ... 363,079
Winding paper and other fabrics, machine for, J. Waldron ... 363,024
Wire stretcher, J. Shipley ... 363,176
Wire stretcher, J. T. Alexander ... 363,191
Woodworking machine, D. Picard ... 362,993
Woodworking machine gauge, N. Stalter ... 363,016

DESIGNS.

Box, C. W. Schumann ... 17,351
Desk furniture, H. G. Smith ... 17,252
Hardware, ornamentation of builders', R. W. E. Christesen ... 17,344
Suspender strap, W. F. Osborne ... 17,347
Toothpick holder, etc., H. Franz ... 17,345
Type, font of printing, H. Ihlenburg ... 17,346
Type, font of printing, C. Schraubstadter, Jr ... 17,350
Type, font of printing, J. West ... 17,353
Watch case, F. Rapp ... 17,348, 17,349

TRADE MARKS.

Bells for churches, engine houses, or other fire alarms, schools, or other places or purposes, J. B. Dodds ... 14,380
Bleaching powder, chloride of lime, sulphate of soda, caustic soda, and potash, W. Pilkington & Son ... 14,413
Cane and sorgo mills, L. M. Rumsey Manufacturing Company ... 14,417
Collars, cuffs, and shirts, W. G. Jughardt ... 14,406
Cutlery, edge tools generally, and saws and files, W. T. Stainiforth ... 14,419
Duck, Schlaepfer, Ferber & Co ... 14,418
Earthenware and china, Doulton & Co ... 14,381
Flour, A. Kufeke ... 14,387 to 14,399, 14,407 to 14,411
Garments, men's, boys', youths', and children's outside, H. Bach ... 14,379
Knitting cotton, Riddle Manufacturing Co ... 14,416
Liniment, B. F. Jones ... 14,405
Liniment, Arabian Spavin Cure Co ... 14,378
Liniment, oil, A. Loomis ... 14,412
Medicinal purposes, waters for, Natural Mineral Water Company ... 14,400
Medicine for horses and cattle, Somerville Medicine Co ... 14,401
Oat groats, Douglas & Stuart ... 14,404
Pomade, H. Cohen ... 14,402
Rubber belting, Revere Rubber Company ... 14,415
Salve, J. F. Corry ... 14,403
Ship logs, T. Walker & Son ... 14,422
Ship logs and sounding machines, T. Walker & Son ... 14,420, 14,421
Shoes, A. M. Herrod & Co ... 14,384
Soaps and perfumes, toilet, W. Hill ... 14,385
Underwear, all kinds of, J. Holroyd ... 14,386
Wall finish, Harrison Bros. & Co ... 14,383
Wall paper, C. H. Provost ... 14,414
Yarns, threads, braids, and silk or linen webbing, H. E. Frankenberg ... 14,382

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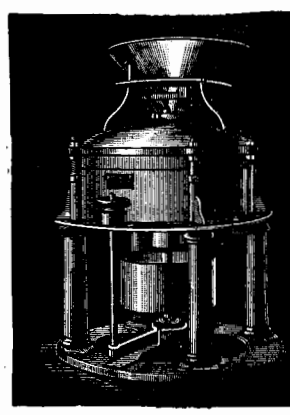
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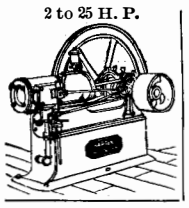
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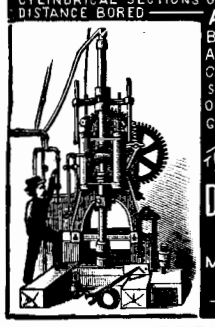
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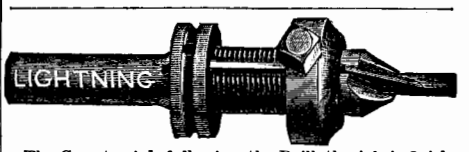

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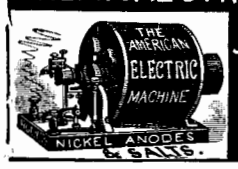

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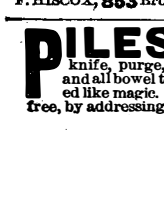

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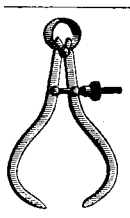

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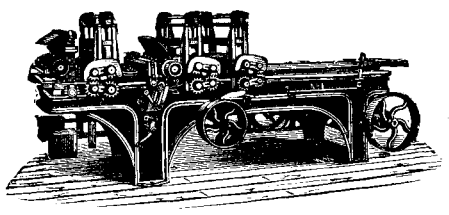

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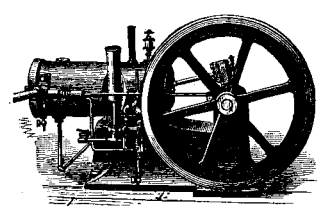

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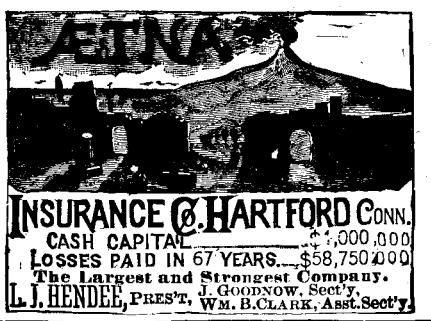

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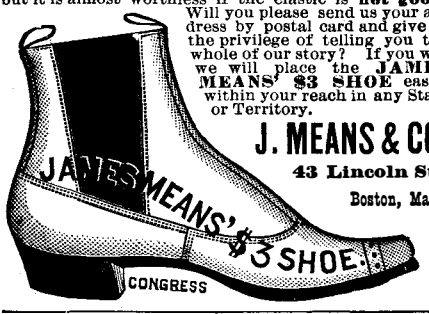

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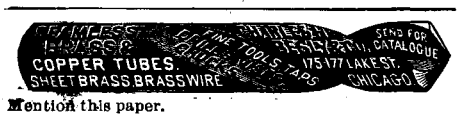

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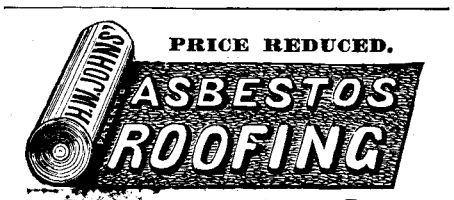

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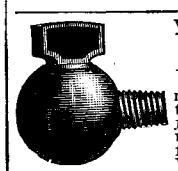

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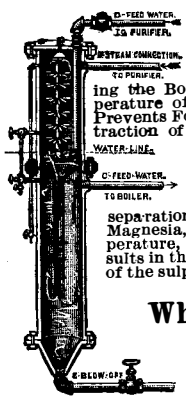

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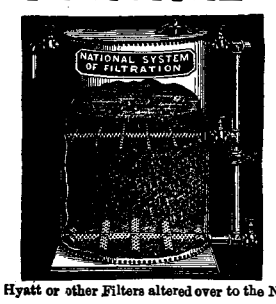

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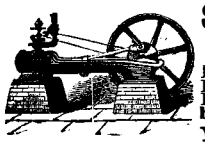

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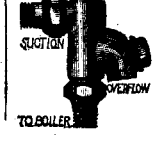

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